ARCHAEOLOGICAL SURVEY OF ALBERTA

CULTURE CHANGE IN THE NORTHERN PLAINS: 1000 B.C.-A.D.1000

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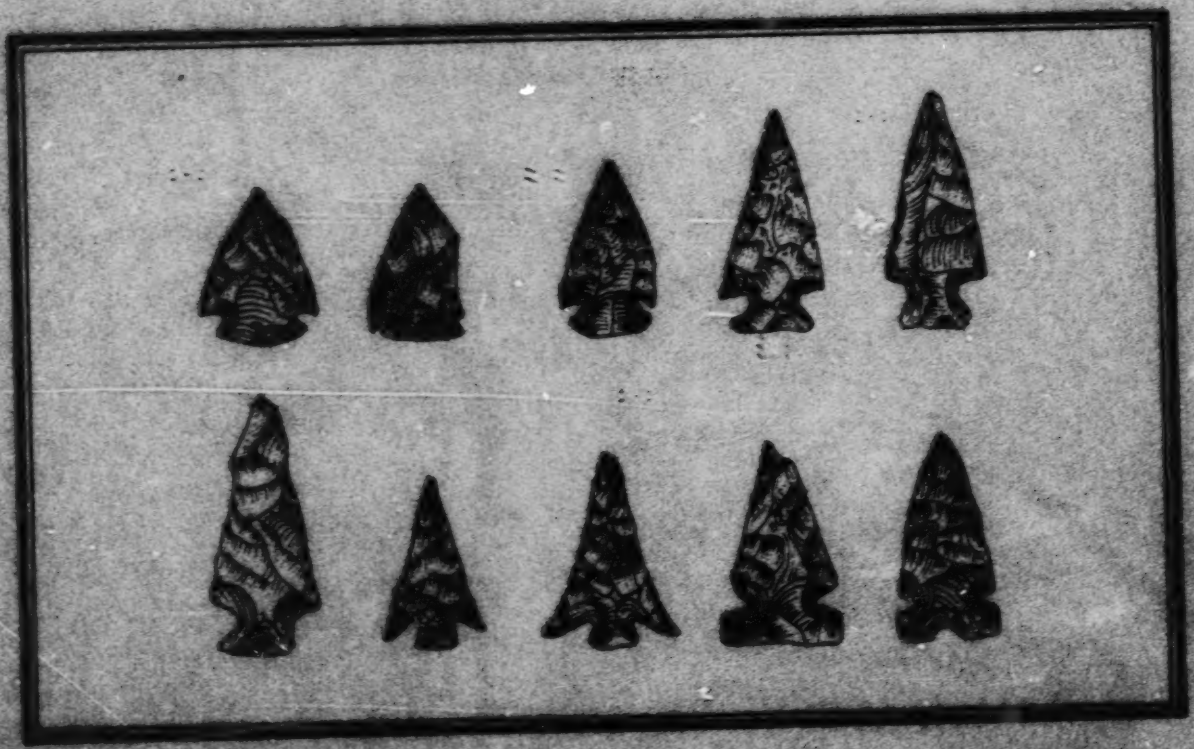
Brian O.K. Reeves



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CULTURE CHANGE IN THE NORTHERN PLAINS: 1000 B.C. - A.D. 1000

BY

BRIAN O.K. REEVES

ARCHAEOLOGICAL SURVEY OF ALBERTA

OCCASIONAL PAPER NO. 20

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Objectives

These Occasional Papers are designed to permit the rapid dissemination of information resulting from Historical Resources' programmes. They are intended primarily for interested specialists, rather than as popular publications for general readers. In the interests of making information available quickly to these specialists, normal publication procedures have been abbreviated.

ABSTRACT

During the period from 1000 B.C. to A.D. 1000 many changes occur in the prehistoric cultures of the northern half of the Great Plains. The bow and arrow, ceramics, corn horticulture, new burial techniques and settled village life appear in certain areas during the first few centuries A.D. Of these only the bow and arrow appearing from the northwest spread over the whole area. The others penetrated to varying degrees from the east, thereafter allowing finer distinctions of archaeological units. The evidence also suggests that some of these traits diffused as isolated traits while others may have been introduced by cultures moving into the Plains from adjacent areas.

It is my belief that the Northern Great Plains is a viable culture area within which cultural developments are best understood by viewing them within a taxonomic framework of archaeological units--the phase and cultural tradition.

Archaeological research in the area under consideration has been widely separated both in space and time. In some areas work undertaken in the early thirties provides the only data available. The few integrative studies that have been carried out have concentrated on the establishment of widespread horizon styles with the result that projectile point types have obtained an entirely unwarranted status. While a useful ordering device, their use has resulted in the creation of projectile point cultures. In the past 19 years since Mulloy's (1953) study considerable data have been acquired and it is now possible to offer a more meaningful synthesis of the Northern Plains Prehistory.

In the following thesis 200 archaeological components and 155 radiocarbon dates are utilized to develop 11 phases, 8 subphases, and 6 cultural traditions. The phases and subphases are described in terms of their artifact, settlement, subsistence, and burial systems. The relationship of these various phases and cultural traditions are examined to determine if they represent either indigenous populations who became acculturated to new cultural patterns or intrusive populations into the

northern half of the Great Plains.

Of principal interest is the Besant Phase of the proposed NAPIKWAN cultural tradition which appears at ca. A.D. 1-100 in the Middle Missouri area. Besant apparently represents an intrusive population from the Northeastern Plains and adjacent Woodlands, which as a consequence of participation in the Hopewellian Interaction Sphere, expanded onto the Northern Plains, partially displacing the resident populations of the Pelican Lake Phase of the proposed TUNAXA cultural tradition. Their dominance over the resident populations was incomplete, with the result that the TUNAXA cultural tradition persisted into the Avonlea Phase, which exists coevally with Besant in the Northwestern Plains.

The relationships and origins of the phases of the Plains Horticultural Tradition such as Valley, Loseke Creek, and Keith are also examined, and it is suggested that these, to a large extent, represent indigenous populations whose culture is changed as a result of contact with other areas, principally the Eastern Woodlands.

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Ole Christensen assisted me on most of the 12,000-mile odyssey through Canada and the United States in May and June of 1967. What with tenting next to railroad tracks and in rifle ranges in the middle of the night, all-night drives of 700 miles, the no speed limit on the interstates, a few close calls, endless hamburgers, coke and other beverages it is an experience I shall not soon forget. Les Davis and Charlie (Brown) Eyman

have patiently listened to my occasional outbursts of astounding revelations, and my wife Mary Ann, has I hope suffered through the last thesis.

Elaine Humphrey persevered with typing through my illegible script to the many "final" drafts. Ole Christensen, Russ Glover, Laurie Armstrong, and Nancy Lowrey prepared the illustrations. I would like to thank the various personnel of the Department of Stenographic Services of the University who assisted with the typing.

Finally I would like to thank the National Research Council for support of the field work, and the Canada Council for partial support of the preparation of the manuscript.

Much gratitude is also due to my thesis committee: Dr. R. G. Forbis, Dr. David H. Kelley, Dr. Jane H. Kelley, Dr. L. V. Hills and Dr. R. S. MacNeish.

I would like to dedicate this thesis to those amateur archaeologists without whose cooperation and past work much of the data could not have been obtained.

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PREFACE

The decision to publish a dissertation some thirteen years after its completion is a bit unusual and deserves comment. Over the past decade, Brian Reeves' Ph.D. dissertation has been one of the most frequently cited documents by archaeologists working in the northwestern Plains. Most of us possess worn xerox copies of someone else's xerox copy, and before we move into a third generation of duplications it seems advisable to put this important manuscript into print. To delay any longer would run the risk of the document itself entering the archaeological record.

However, in recognition of the numerous studies conducted since 1972, and the concomitant shifts in our knowledge about Late Prehistoric Plains archaeology, Reeves was asked to write a Foreword for his dissertation. In this, Reeves attempts to update his original manuscript and to bridge some of the gaps which have appeared since 1972. Clearly, a complete rewriting of the document was out of the question. It can only be hoped that the publication of the Foreword with the original dissertation, will serve as a primary reference document for those interested in Plains archaeology.

I would like to acknowledge the assistance of two individuals who helped with the preparation of this monograph. Heather Nelson performed many general editorial duties and was responsible for pulling all the disparate parts into a cohesive whole. The text of the dissertation is presented here essentially unchanged from Reeves' original version. The Foreword, however, was subjected to several bouts of editing. The intent here was not to alter any of Reeves' meaning, but rather to transform his somewhat novel usage of English into a more traditional format.

Our draftsperson, Wendy Johnson, worked many days on the formidable task of altering the original graphics to conform with our Occasional Paper format. Dramatic reduction of many oversized tables and graphs was required, and the fact that they are still legible to the determined reader is evidence of her skill.

J.B.

FOREWORD

The beginning of what eventually became Culture Change on the Northern Plains dates to the completion of my Masters thesis in 1966, at which time I was sitting in a tool trailer directing excavations at Head-Smashed-In Buffalo Jump. Between then and 1970 when the dissertation was finally completed, I was not only teaching at the University of Calgary, but was, as well, directing excavations in Waterton Lakes National Park (Reeves 1972), and studies in Banff National Park (Christensen 1972). My life appears to be eternally characterized by doing at least two things at the same time. Although these projects delayed my dissertation research, they made substantive contributions both to the data base of my dissertation and to the various hypotheses and thoughts developed in it.

There has been a lot of dirt through the screens in the last decade. The data base for the Northern Plains and Rocky Mountains has quantitatively exploded, particularly since the implementation of antiquities legislation on a federal level in the United States and a provincial level in Canada. However, this explosion does not appear to have significantly improved the quality of archaeological information. Witness the fact that the relatively few new integrative cultural historical studies such as mine, Byrne's (1973) or Syms' (1977) are based largely on pre-1970 data.

The major published work of the 1970's is George Frison's (1978) Prehistoric Hunters of the High Plains. This popular text draws primarily on his work in Wyoming, a fact which limits its values as a synthetic work, as does his most unfortunate reintroduction of the Archaic stage as an "integrative" unit for Post-Paleo-Indian/Pre-Ceramic Northwestern Plains cultures. Use of such terminology for our area, instead of Mulloy's, had been roundly criticised earlier (e.g. Forbis 1968). "Archaic" is now "vogue" in many cultural resource management studies being produced by young, inexperienced archaeologists where it has served as a catchall, obscuring both relationships and issues at hand.

The cultural resource management orientation of the 1970's, combined with the Binfordian approach and its disdain of culture history, has had

generally negative effects on advancing our understanding of Northern Plains/Rocky Mountains cultural historical processes. Much of the archaeology conducted has been concerned with small surficial sites. Many cultural resource management practitioners in the Northwest Plains have not been familiar with the local data base. It is hard to "get off" on tipi rings if you are used to mounds in Missouri. Vast tracts of culturally empty lands appear to exist in the Northwestern Plains, particularly in eastern Montana. To me, as to many others, this is a problem in site visability and professional competence. Major resources have undoubtedly been lost. Fortunately, the lands are vast, and we hope cultural processes have repeated themselves elsewhere.

In sum, despite a lot of archaeological activity, the data base on that 2 millenia wide window (1000 B.C. - A.D. 1000) focussed on in my dissertation has been acretionary in general rather than revolutionary. My basic constructs on the Pelican Lake, Besant and Avonlea phases, the foci of my dissertation, still appear to be viable despite Syms' (1977) assault on parts of the cultural historical facade.

What follows in this preface is a general review of the spatial, temporal and cultural dimensions, origins and relationships of the three core phases of my dissertation, highlighting, I hope, the more major archaeological studies of the last decade. My review is not exhaustive, and I have excluded the Middle Missouri, Central and High Plains regions (The Dakotas, Nebraska and Colorado). I apologize in advance for any significant omissions but not for further commissions of sins venial or cardinal.

PELICAN LAKE PHASE

Spatial Dimensions

Pelican Lake's western and northern boundaries have been better defined over the last decade, particularly in the Rocky Mountains. Choquette's (1974) research in the Rocky Mountain Trench in the early 1970's and Rohl's research on the Montana side in the late 1970's have defined a well developed Pelican Lake Phase occupation throughout the Kootenay Valley. Unfor-

tunately, Choquette's data, of major significance to northern Rocky Mountain archaeology, languished largely unanalyzed in the British Columbia Provincial Museum.

On the basis of artifact microstylistic variation and lithic source utilization and patterning, the Kootenay Valley sites appear most closely related to Pelican Lake in the Crowsnest Pass as defined during a major programme of conservation and research excavations between 1972 and 1980 (Reeves 1974 a and b, Driver 1978, Kennedy et al 1982).

The Crowsnest (Burmis Subphase) and Kootenay Valley materials can be microstylistically and lithically discriminated from the local Pelican Lake Subphase (Blue Slate Canyon) in Waterton Lakes National Park 60 km. to the south, as defined in my 1972 manuscript report. The boundary is distinct, reflecting differential quarry source utilization, travel and trade within the Northern Rocky Mountains of southern Alberta and northern Montana.

Burmis is closely linked to the Mortlach Subphase in southwestern Alberta as represented at the Head-Smashed-In (Reeves 1977) or Old Woman's Buffalo Jumps (Forbis 1962). It appears to be a regional variant, encompassing the eastern slopes and foothills from at least the Kootenay Plains on the North Saskatchewan River (Reeves n.d.) and the Bow Valley in Banff National Park (Christensen 1972) south to the Crowsnest Pass. On the west it extends from the Libby/Troy area of the Kootenay Valley in Montana north to the headwaters of that river. Whether the headwaters of the Columbia and the Columbia-Windermere Lakes lie within tha area remains to be determined. At that time (ca. 1000 B.C. - A.D. 1000) this latter area may have been occupied by "Fraser Plateau" pithouse dwelling, salmon fishing peoples related to the Shuswap Lake area.

Burmis Subphase peoples probably moved on a regular seasonal or multi-year basis between the eastern and western slopes of the Rocky Mountains, as winter sites occur both in the Eastern Slopes and Rocky Mountain Trench.

One of the substantive advances of the 1970's in the Canadian Rocky Mountains was the identification of the quarry sources for some of the

distinctive lithics found in Pelican Lake and other sites. Principal among these are the Top-of-the-World Quarry (Choquette 1981) and the Livingstone Quarries (Loveseth 1980). The former, a traditional Kootenai quarry at the head of the Bull River in southeastern British Columbia, is the source of the distinctive grey and blue grey chalcedonies referred to in my thesis while the latter, located in the Crowsnest Pass, produce a variety of red-brown and grey cherts. Other sources have been identified in the Rockies to the north (Anderson and Reeves 1975).

The northern boundary of Pelican Lake appears to be more or less coincidental with the Parkland edge as defined historically. Conservation studies in the western Boreal Forest of central Alberta (Calder and Reeves 1977), the Peace River country of Northeastern British Columbia (Spurling 1980) and Alberta, and the Lesser Slave Lake and Calling Lake area (McCullough pers. comm.) of Alberta suggest it is absent. Pelican Lake is not well represented at Lac La Biche (McCullough 1977) or in the Cold Lake Region, suggesting all these areas were occupied primarily by Boreal Forest peoples, some of whom were related to the Taltelli Shale Tradition (Spurling 1980). McCullough (1977) suggests Pelican Lake peoples in the lake lands area probably intentionally fired the Boreal Forest to keep it open.

The purported presence of Pelican Lake in the Lower Athabaska (Pollock 1978) or even further north (Noble 1971) is based on a lack of understanding, not only of what constitutes a Pelican Lake projectile point, but also the nature of the cultural construct itself.

Although Pelican Lake is present in the Parklands along the Saskatchewan River, it is my impression that it is not well represented in collections or excavated sites, either in the Edmonton area or further east in Saskatchewan (e.g. Meyer 1977). Parkland collections appear to be dominated by the side-notch atlatl points of Bitterroot, Salmon River, Oxbow, Sandy Creek and Besant.

Temporal Dimensions

Additional radiocarbon dates obtained during the last decade have

generally substantiated a time range of ca. 1200 B.C. - A.D. 100-400, depending on the location. New early dates on Pelican Lake from the Holmes Terrace Site on the Missouri of ca. 1720 B.C., the Schmidt Mine of ca. 1290 B.C. and the Pilgrim Tipi Ring Site of 1540 B.C. (Davis et al 1982b) suggest that the phase transition from Hanna, proposed in my thesis at ca. 1300 B.C., is somewhat earlier at ca. 1400 - 1500 B.C.. This supports early dates obtained by Brumley (1975) at the Cactus Flower Site on the South Saskatchewan below Medicine Hat and Dyck (1983) at the Sjovold Site near Outlook, Saskatchewan.

Pelican Lake termination continues to vary significantly between the regions of the Plains and the Montana - southern Alberta Rocky Mountains. Recently acquired dates from southwestern Montana, particularly a date of A.D. 350 from the Schmidt Mine (Davis et al 1982b), supports a terminal date of ca. A.D. 400 for the area from Waterton Park south. In contrast, in the Crowsnest Pass (Reeves et al 1982) the phase transition to Avonlea appears to be somewhat earlier, ca. A.D. 100 - 200, comparable to that on the Plains (Reeves 1978a).

Cultural Dimensions

In recent years some important additions have been made to Pelican Lake's cultural record. Substantive data have been obtained for Waterton (Reeves 1972), Crowsnest (Driver 1978, Kennedy et al 1982) and the Kootenay Valley (Choquette 1973; Rohl pers. comm.), not only on the technological and lithic extractive systems, but on seasonal land and resource use patterns. An altitudinal, seasonally structured pattern exists with a focus on spring and fall lake and river fishing and bison driving on the eastern slopes. In the west, spring fishing and spring and fall elk and deer hunting occur. Alpine meadows are exploited in mid-summer.

The role of tipi ring encampments in the Pelican Lake settlement system has been substantially expanded with Davis' Pilgrim Site excavations (Davis et al 1980; Davis et al 1982a) in the mountains south of Helena, Montana. This site appears to have been primarily occupied in the spring and summer seasons. Tipi rings are also associated with a buried,

late fall Pelican Lake campsite in the Crowsnest Pass (Calder et al 1977), which is the only tipi ring site found to date in the Alberta Rockies.

Two buried Pelican Lake winter tipi ring sites have been excavated in the western Alberta Plains. These include a single ring on the Red Deer River 40 km. east of Red Deer (Smith and Reeves 1978), and a multiple ring, multi-occupation site on the Bow River in Calgary (Van Dyke 1982). Major buried campsites with Pelican Lake components have been excavated in recent years, including the Stampede Site (Gryba 1975) and the Elk Water Sites (Brumley et al 1981) in the Cypress Hills of Alberta, the Sjovold Site in southern Saskatchewan (Dyck 1982), and Medicine Lodge Creek in the Big Horn Basin (Frison 1978). When fully published, these sites will produce substantive comparative data for analysis of subphase variation within Pelican Lake. The long awaited Mummy Cave publication (McCracken et al 1978) unfortunately is only a bastardized version of the full manuscript. It is of little utility.

The most important contribution in Pelican Lake studies is the ongoing work of Davis at the Schmidt Mine near Three Forks, Montana (Davis et al 1978). Schmidt is particularly significant in documenting the complexity and scope of Pelican Lake mining activities, providing insight into the nature of Pelican Lake society itself.

Considerable prehistoric manpower was evidently made available at Schmidt for the extraction of preferred lithic materials even though this involved a large expenditure of energy when compared with more accesible lithics in southern Montana, such as obsidian and basalt.

Other identified quarries in southern Montana, for example South Everson (Davis 1981) on the Continental Divide southeast of Dillon; Doggett, northwest of Big Sulphur Springs; Avon, west of Helena; and others appear to have attained their maximum use during Pelican Lake times.

These data suggest not only that Pelican Lake was a well organized and integrated hunting culture, but also a considerably human population which ranged the Northwestern Plains and Rocky Mountains.

A Pelican Lake burial pattern is now documented for southern Alberta

and Saskatchewan (Baldwin 1981). It is characterized by red ochre covered, single primary or secondary subcairn burials with a few associated grave goods. Pelican Lake burials are represented at the Bracken Cairn on the Frenchman River in Saskatchewan, at Cardston and on the Highwood River east of Okotoks, Alberta.

Origins

In my dissertation I proposed that Pelican Lake probably developed out of the McKean and Hanna Phases and was a temporal phase of the Tunaxa cultural tradition. I remain comfortable with this construct, which is supported by Brumley's Cactus Flower excavations (Brumley 1975) where we observe a basic technological continuity in tool types and technology. Nevertheless, a detailed technological analysis of temporally adjacent components of the Pelican Lake and Hanna and McKean complex phases is required, as well as comparative analysis to excavated eastern slope components of the Late Mummy Cave Complex (Reeves 1973). The latter is contemporary with McKean-Hanna on the Plains. Eastern Slopes data (Reeves 1978b) suggest that Pelican Lake is intrusive and a complex interactive situation existed between 1500 and 1000 B.C. between the Plains and the Mountain Cultures.

BESANT

Spatial Dimensions

Besant's western and northern boundaries have been increasingly well defined over the past decade. In Wyoming, Besant bison pounds have been identified in the Powder River [Ruby Site (Frison 1971, 1978)] and Shirley basins [Muddy Creek (Frison 1978)]. A large tipi ring encampment and processing camp (Morris 1981) associated with a cairn which may have been a meat cache (Longenecker 1979) are associated with the Muddy Creek pound. The Muddy Creek Site extends Besant's distribution into southeastern Wyoming and the North Platte Basin.

Besant is now documented in southwestern Montana at the Antonsen Kill near Bozeman (Davis and Zier 1978). In southern Alberta Besant's western

limits are defined by the Foothills fronts (Reeves 1978b). It is absent from Waterton (Reeves 1980), Crowsnest (Driver 1978, Kennedy et al 1982) and the Kootenay areas (Choquette 1974, Rohl pers. comm.). In the mountains Besant Side Notched points occur as isolates in Pelican Lake components. Besant's northern limits are more or less coincident with the Mixed Wood edge. It is absent from the Peace (Spurling 1980) and is poorly represented at Lac La Biche (McCullough 1977). Besant is well documented in collections from the Parklands along the North Saskatchewan and is present in the Nipawin Dam area (Meyer 1977).

Supposedly, Besant is also present in the Lower Athabaska (Pollock 1978) and on the shores of Lake Athabaska (Wright 1975). I have personally examined both collections and found that Besant Side Notched points are not present. The points - possibly a Taltelli Shale variant - lack the diagnostic attributes of basal edge configuration and construction.

Temporal Dimensions

My initial date for Besant of around A.D. 150 - 250 was a conservative estimate as Besant Phase initiation now appears to be earlier. Brumley (pers. comm.) has obtained dates of ca. 2500 B.P. from two adjacent bison processing camps on the South Saskatchewan below Medicine Hat. Similar dates have also been obtained on a Besant Kill in Central Saskatchewan, by Tom Phoenix; suggesting Besant dates ca. 100 B.C. - A.D. 1.

A terminal date of around A.D. 750 is substantiated by Syms' work (1977) in southeastern Manitoba where Blackduck (Manitoba Phase), dating to approximately A.D. 800, follows Besant.

Cultural Dimensions

The most notable addition to the Besant settlement system has been the excavation of Besant tipi ring site: Ross Glen at Medicine Hat (Quigg 1979), a buried winter tipi ring site on the Bow River east of Calgary (McIntyre 1978), and Besant tipi rings in northern Dakota (Schneider and Treat 1976).

A Besant ceremonial structure was uncovered at the Ruby Site (Frison

1978).

Besant ceramics have been positively identified at the Evans Site in northwestern North Dakota (Schneider and Kinney 1978), on the Upper Missouri at High Butte (Wood and Johnson 1973), Whisky Hill (Johnson 1977) and Dune Buggy (Johnson 1979). Their presence or absence in the Saskatchewan Basin continues to be the focus of some debate. Byrne (1973) postulated that ceramics were absent, rejecting the Walter Felt association which most workers consider valid (e.g. Syms 1977). Besant cermaics were probably present at the Garrett and Long Creek Sites (Dyck pers. comm.). According to Byrne, the Missouri Coteaux was a significant environmental barrier to north-south movement between the basins at this time. The validity of this concept has been questioned by a number of writers (Kehoe and Kehoe 1974, Johnson 1977, 1979, Keyser 1980). Despite Byrne's (1981) arguments, the presence of large quantities of Knife River Flint in Alberta Besant sites such as the Muhlback site (Gruhn 1971) is evidence cited by many workers (e.g. Syms 1977) for considerable contact with the Middle Missouri region.

The Coteaux is a physiographic feature only. Archaeological sites are extremely common along the water courses as well as in hinterlands which transect the Coteaux in Saskatchewan. In Alberta there is not even a physiographic break between the basins. The Coteaux was the summer bison range and, rather than acting as a barrier to human movement, the concentration of bison in the area during summer probably facilitated exchange between groups.

Middle Woodland ceramics have now been found in the Saskatchewan Basin in direct association with Besant points at the Intake Site, on the North Saskatchewan, 9 km downstream from Prince Albert. A collagen date of A.D. 745 $\pm$ 80 (S-2185) has been obtained.

In Alberta, sherds were found in association with Besant and Samantha points in a buried campsite in the Wintering Hills along the Red Deer near Drumheller (Loveseth 1982). Perhaps this matter can now be laid to rest.

Besant and Sonota

Besant Plains Woodland relationships are a focus of continual debate in the literature (Johnson 1977, Wood and Johnson 1973, Neuman 1975, Syms 1977). This situation has been made more complex by Syms' (1977) extension of Sonota Complex to include certain Besant components such as the Muhlbach and Richards Kills. The Sonota Complex as defined by Neuman (1975) for the Middle Missouri, to which he originally confined its definition, is the Middle Missouri expression of the Besant Phase proposed by me in my dissertation. Neuman has utilized the same sites in defining the Sonota Complex as I have used to define the Besant Phase Middle Missouri variant and mound burial pattern: the Stelser Campsite, Swift Bird, Grover Hand, Arpan and burial mound sites. My analysis was based on first hand examination of the collections in 1977 in Bismarck and Lincoln. A number of other sites were also included as possible Sonota or Besant components by Neuman and myself; specifically Porcupine Creek, Alkire Mounds, LaRoche, Bald Hill and Inidan Hill.

While Neuman did not initially include Besant within his Sonota Complex definition, in his monograph he did discuss possible relationships with published Besant sites (Muhlbach, Old Womans, Mortlach, Walter Felt). He noted the close relationships in point types, bone uprights and other items. Neuman concluded that a close linkage existed with the primary difference being the burial mound complex: ". . . the Sonota Burial Mounds offset this complex from other known Besant sites . . ." (ibid 93). In the monograph Neuman eventually extended the concept of Sonota to include Besant.

> The Sonota Complex is an archaeological expression representing a regional segment of a cultural tradition which effectively exploited the plains-riverine environment of north-central North America. . .. For the western range of this culture, in the southern portions of Alberta and Saskatchewan, in Montana, and in the western parts of the Dakotas, the archaeological data are drawn from investigations describing the remains of campsites and buffalo impounding or jump butchering stations.

> Such sites are characterized by layers of buffalo bone, stone tools, a lesser number of bone implements, and only rarely small quantities of pottery fragments. On the other hand, along the main trench of the Missouri River and smaller drainages in the eastern Dakotas, comparable artifacts are found in low, domed burial mound groups and in campsites herein assigned to the Sonota Complex. In this eastern range the basic artifact inventories are amended by an increase in ceramics, along with a variety of specialized regionally elaborate, and at times exotic stone, bone, shell, copper, vegetal and pigmentary specimens, most of which are associated with the burial mound interments. (Neuman 1975:96).

Historically, as Besant has terminological precedent in the literature over Sonota (Wettlaufer 1956, 1960, Forbis 1962, David and Stallcop 1966, Gruhn 1971), the use of the term Sonota should be restricted to the mound burial pattern.

Syms (1977) has confounded the issue by establishing an artificial separation between Besant and Sonota. He extends Neuman's concept to include certain Besant sites on the basis of point styles (long points) and the quantities of Knife River Flint (Muhlback and Richards Kill), ceramics (Walter Felt) or both (Richards Village). Syms excludes other sites with varying quantities of Knife River Flint and short and long points - the Kenny Site (Reeves 1966), Old Woman's (Forbis 1962) and 24HL101 (Davis and Stallcop 1966) for example.

Syms (1977:91-92), in attacking my construct of the Besant Phase, claims:

> Reeves (1970a, 1970b) defined a Besant Phase for the Northern Plains. In fact, he defined a horizon since his criteria of identification was the presence of projectiles with shallow notches at the sides, which he called the Besant Side-notched and Samantha Side-notched projectile points. His sweeping distributional claims incorporated Sonota Complex mounds and sites in the Dakotas, Late Woodland Blackduck mounds, Laurel Composite sites in eastern Manitoba, mounds of southwestern Manitoba, and a large number of kill

> sites, cave or rock shelter sites and, finally, most numerous of all, surface collections (Reeves 1970a:80-91 1970b:164-166).

I take strong exception to this statement. I would first note that my analysis was based on a "hands-on" examination of all collections; Syms' was not. The Besant Phase is defined in my dissertation as a technological assemblage, the most easily identifiable of which are projectile points. Characteristic endsrapers, drills, bifaces and ceramics occur, as does a lithic use pattern (Knife River Flint). Distinctive settlement features include hearth types, pits, lodges and bone uprights (see pages 140-141). Sonota mounds and sites as I have previously noted, are Besant; the Blackduck burial mound descriptions, based on Capes', appear quite similar to Besant (Sonota) mounds (pages 98 and 99). I suggested a temporal linkage with these later Blackduck burial mounds and also that burial mound construction probably began in southwestern Manitoba in Besant times (page 98), as Syms (1977:88) has also suggested.

Syms takes considerable umbrage that I should extend Besant to include "Laural Composite sites". I assume he is referring to Avery and United Church; both of which, as I have noted in my dissertation (pages 235-236), are characterized by very poor stratigraphy.

Syms (ibid 92) prefers to define a "Besant Horizon" on the basis of projectiles with shallow corner notches, in which he sees tremendous variability which has not been systematically quantified. Syms is correct in that a statistical analysis has not been performed to examine intra-phase variation. It would be most useful to do so. Non-metric technological attributes of Besant projectile point construction and modification in the hafting area are the primary criteria utilized by myself and most workers for identifying Besant Side Notched projectile points and separating them from other styles; not, as Syms would have it, whether they are long or squat with well defined or shallow notches. Identical constructions occur on the points from Muhlbach, Walter Felt and Richards and Stelzer which Syms assigns to Sonota because they are made out of Knife River Flint, as are the points from Old Woman's and Morkan which he assigns to

Besant because they are not Knife River Flint and are squat. Syms' assignment is presumably based, in part, on illustrated specimens and not on "hands-on" examination. He also selects his evidence. He does not discuss Mortlach, Long Creek, Kenny or 24HL101; four of the major Besant sites for which reports were available at the time of his analysis. For example, 24HL101 is characterized by long points and a low frequency of Knife River Flint. Logically, Syms would require a third construct to account for this variation.

Syms falsely implies that I utilized surface collections in my definition of the Besant Phase; I did not. However, Syms commits this very error by assuming that surface collections from sites in southwestern Manitoba ". . .with large numbers of squat Besant projectile points made from Swan River chert. . ." (ibid 92) are in fact Besant points associated with the Besant Phase of the Christian era and not an earlier projectile point type.

In sum, in contrast to Syms' opinion (ibid 92), I do not think the definition of Besant needs to be reassessed. It is not a separate complex from Sonota which can be combined with the latter at the level of a "composite configuration". The Sonota Complex senso lato is the Besant Phase of the Northwestern Plains; senso stricto the Sonota Complex is the Besant Burial Mound complex of the Middle Missouri. I urge that the term Sonota at best be restricted to this burial mound complex.

Origins

In my dissertation (p. 141 following) I reviewed a number of alternate hypotheses for Besant's origins. On the data then available, I concluded that it most probably represented a Plains cultural tradition, present on the northeastern periphery and separate from Pelican Lake or Plains Woodland, and that there might be some relationship to Sandy Creek, as defined by Wettlaufer (1956) at Mortlach. More recently I have suggested (Reeves 1978b) that Besant might technologically be derivative from the Late Oxbow Complex.

Data from Saskatchewan, acquired over the last decade, substantiates

this hypothesis. Dates from the Harder and Carruthers Sites, both late Oxbow sites in Saskatchewan, range from ca. 1300 - 1000 B.C., suggesting Oxbow persisted there after its replacement in the Plains by the McKean-Hanna/Pelican Lake sequence of the Tunaxa cultural tradition. Cherry Point (Haig 1976) in southwestern Manitoba, although stratigraphically complex, also suggests a late survival of the Oxbow Complex.

The Sandy Creek Complex, documented and first dated at Mortlach at 450 B.C. ± 173 (S-22), was also found in Layer 15D at Walter Felt which was dated at 450 B.C. ± 90 (S-297). Most recently it was found at the Sjovold Site (Layer 12) where it is estimated to date to 2300 B.P. (Dyck 1983). In all three sites Sandy Creek lies interdigitated between Pelican Lake components. At Sjovold, Layer 14 dated at 730 B.C. ± 165 (S-1768), yielded points very similar to these early Besant variants found in the mid Pelican Lake levels at Head-Smashed-In and estimated to date ca. 500 B.C. (Reeves 1978a).

These data suggest that a cultural complex characterized by small shallow side-notched points is coeval with Pelican Lake in the Saskatchewan Basin. Sandy Creek points, technologically transitional between Late Oxbow and some Besant Side-notched points, are charcterized by squat forms, shallow side-notches and shallow offset V-shaped bases. Locally available materials, particularly Swan River Chert and quartzites, are emphasized in Late Oxbow and Sandy Creek.

These data suggest Besant is technologically related through Sandy Creek to Late Oxbow [An opinion shared by Ian Dyck (1983)]. Sandy Creek persisted in the Parklands during Pelican Lake times, emerging around the time of Christ as the Besant Phase, which subsequently expanded over the Plains as a result of their entry into a Hopewellian trade network and consequent social-cultural changes inside the culture.

AVONLEA

Spatial Dimensions

Spatially Avonlea has been increasingly well defined along its western and northern borders. Avonlea has finally been recognized in Wyoming

(welcome to the world!) where it is identified in a series of "defensive" sites on bluff tops and buttes in the Big Horn Basin (Morris 1981), at a campsite in the Wind River Basin (Zeimens 1979) and at the Wardell Bison Pound and Processing camp (Frison 1973) in the Green River Basin. This extends Avonlea's distribution considerably to the southwest. The Worthan Shelter (Greer 1978) in the Big Horn Basin provides additional data on Avonlea's southern distribution.

Avonlea kill components have been identified at the Antonsen Site (Davis and Zeier 1978) at Bozeman and at a bison kill west of Dillon, Montana, extending its range through the Montana intermountain area west to the northern Idaho Rockies. Avonlea components occur in the Kootenay River Valley in northern Montana (Rohl pers. comm.) and southeastern British Columbia (Choquette 1974), and in the eastern slopes in Waterton (Reeves 1972, Reeves 1980) and Crowsnest (Driver 1978). In the Alberta Rockies it extends as far north as Banff National Park (Christensen 1972). Avonlea is absent in the Athabasca Drainage (Anderson and Reeves 1975).

In contrast to Pelican Lake, the local mountain valley subphases of Avonlea are technologically and lithically well integrated, primarily utilizing Top-of-the World quarries, a common lithic type in basal Avonlea components at Head-Smashed-In (Reeves 1978a). Argillite from the Kootenay Lakes is absent in mountain Avonlea assemblages, suggesting different trade and exchange networks than in earlier Pelican Lake times.

Avonlea's northern Parkland edge is not well defined. While it is absent in the Peace (Spurling 1980) and very rare at Lac La Biche (McCullough 1977), suggesting that the boundary is to the south of the mixed wood, it has been identified both at Nipawin (Meyer 1977) and at The Pas in Manitoba (Tamplin 1977). Based on my personal inspection, Avonlea's purported presence on the Lower Athabaska (Pollock 1978) is a case of projectile misidentification.

Although present in the Parkland edge, I have the impression that Avonlea is much less frequent than the coeval Besant/Samantha point continuum (Losey 1978) suggesting a more restricted and longer plains/grasslands Avonlea occupation in Alberta.

Temporal Dimensions

A substantial number of additional radiocarbon dates (Davis pers. comm.) extends Avonlea's temporal duration. The earliest Plains dates are still from Head-Smashed-In - ca. A.D. 150 - 250. Initial dates in the adjacent mountains vary; in Waterton it is ca. A.D. 400, while in the Crownest, Avonlea dates to A.D. 200 (Kennedy et al 1982).

Phase termination continues to vary. In southwestern Manitoba, where Avonlea makes only a brief appearance, Avonlea is replaced by Blackduck (Manitoba Phase) and in Saskatchewan by Prairie Side-notched or Old Woman's Phase aournd A.D. 700 - 800. Progressively later terminations occur to the west and south. Dates at the Ramilees (Brumley 1976) and Estuary (Adams 1977) bison kills, and a re-evaluation of the Head-Smashed-In termination (Reeves 1978a) suggests a date of A.D. 900 - 1100 for replacement by Old Woman's in the southern Alberta Plains and Foothills.

A date of A.D. 1100 - 1200 appears appropriate for transition to the Tobacco Plains Phase in the Waterton and Crowsnest Valleys (Reeves 1978b, 1980) and in the Rocky Mountain Trench (Choquette 1974).

The Upper Missouri (Davis pers. comm.) exhibits a similar time transgression with dates of ca. A.D. 1000 in the northern Montana Plains and A.D. 1100 - 1200 in southwestern Montana.

Cultural Dimensions

A number of new archaeological sites have been excavated in the last decade which add substantially to our knowledge of Avonlea's cultural systems, particularly subsistence.

Sites of major importance include the Lost Terrace Antelope Kill on the Missouri (Davis 1978), the Ramilees Bison Kill (Brumley 1976), a stone wall enclosure with drive lanes on the Suffield Military Reserve, the Estuary Bison Kill (Adams 1977) and the Wardell Trap in Wyoming (Frison 1973). Major jumps which have been published include Gull Lake (Kehoe 1973) and Head-Smashed-In (Reeves 1978a). Additional excavations were undertaken in 1972 at Head-Smashed-In to clarify the Avonlea/Old Woman's Phase transition; it appears to be a case of gradual change rather than

replacement.

Published reports on Avonlea campsites of the period include winter camps in the Foothills of the Belly River in southwestern Alberta (Quigg 1974), at the mountain front in nearby Waterton Park (Reeves 1980) and in the Garret Site at Moose Jaw (Morgan 1979). A major Late Avonlea tipi ring site, excavated on the Red Deer River near Empress (Reeves 1977) remains to be analyzed.

Technologically these sites have added important dimensions to our understanding of Avonlea stone tool technology, which is characterized by a microlithic punched blade-core tradition involving small conical and hemi-conical cores and production of prismatic bladelets (Reeves 1972, 1977, 1980). Attributes of the western microblade technology, wedge shaped cores or truncated microblades for example, are absent. The blade/core tradition is replaced through time by the split-pebble Rundle technology (Reeves 1972), involving the use of small black chert pebbles to produce pièce esquillées, endscrapers, point blanks and small parallel sided flakes by the bipolar hard anvil technique - probably employing punches. This technology is characteristic of the Old Woman's Phase (Reeves 1980).

Ceramics are now well documented for the Avonlea Phase by Byrne (1973), recently at the Gohean Site on the Lower Yellowstone (Johnston 1981), and Garrett (morgan 1979) and Sjovold (Dyck 1982) in southern Saskatchewan. Considerably variation exists in surface finish, decoration and vessel shape. Of particular interest is the identification by Dyck and Johnson of "corrugated" wares which were originally found at the type Avonlea site (Dyck pers. comm.). In Wyoming ceramics are associated with Avonlea at the Woodward (Zeimans 1979) and Wardel (Frison 1973) sites.

Origins

In my dissertation I postulated an origin for Avonlea in the mountain subphases of the Pelican Lake Phase. I based this on the fact that the earliest Avonlea corner-notched arrow point styles resembled Pelican Lake in form. Also, lithic use patterns at Head-Smashed-In, principally Top-

of-the-World, indicate exploitation of a mountain source and a similar east-west land use pattern to that which I define now as the Burmis Subphase of Pelican Lake.

Intensive research over the past 14 years at Waterton, Crowsnest and the Kootenay Valley has yet to uncover any phase transitional campsite or kill components: either they don't exist; they exist elsewhere; the hypothesis is incorrect (which it may well be); or we just have not found them.

It may well be that a very rapid replacement of the weapons systems occurred in the mountains as it did at Head-Smashed-In. A technological comparative analysis of late Pelican Lake and early Avonlea campsites is required on the Plains. These have yet to be excavated.

Although origins remain enigmatic based on the research of the last decade, it is quite clear that Avonlea did not originate in the northern forests; a concept first suggested by Kehoe in 1967 which still gets some play in the literature [Frison (1978), Frison and Rehr (1980)].

Less obscure than its origin are Avonlea's relationships to the later phases of the Upper Missouri and Saskatchewan Basins. Although not a concern of my thesis, I suggested that Old Woman's developed out of both Avonlea and Besant. Various writers have further discussed this relationship, favouring one or the other, or alternate concepts (e.g. Byrne 1973; Morgan 1979).

The picture today appears complex. In the mountains Avonlea technologically and lithically develops into the Tobacco Plains Phase, the archaeological representative of the prehistoric Kootenai people. Phase transitional components exist in Waterton (Reeves 1980) and Crowsnest (Kennedy et al 1982). In contrast, in the Plains Avonlea develops into Old Woman's, the archaeological representative of the Prehistoric Peigan peoples.

> Lithologically and technologically, these phases are distinct. Tobacco Plains, for example, lacks any ceramics and emphasized Top-of-the-World lithics and a small bifacial core technology, as represented at DjPp-3, a major summer campsite in the Crowsnest Pass (Reeves 1974; Loveseth 1980). Projectile point styles, while within the general

> range of "Plains Side Notched", have distinct easily recognizable micro-stylistic traits. Other tool types (bifacial knives and scrapers, for example) are also distinct.
>
> Old Woman's Phase is characterized by ceramics, emphasizes local Plains or Montana lithics to large measure, and has a technology characterized by the extensive use of split pebble techniques to produce blanks for end scrapers, points, pièces esquillées, and burin-like spalls. There is also extensive use made of petrified wood. Projectile point styles are micro-stylistically descrete, particularly those representative of the close of Prehistoric times (Washita)
>
> (Reeves 1980:88)

Technologically transitional sites exist between the phases, DgP!-10 (Reeves 1980) in Waterton, for example, as well as other Late Avonlea sites in Waterton.

> . . . while aceramic, contains stylistic and technological elements within the same lithic suit - Top-of-the-World. Point forms range from "classic" Timber Ridge Side-notched to Plains Side-notched, and technologies include microlithic blade/core, bifacial core, as well as split pebble and petrified wood, although the latter is much better developed at certain transitional sites in southeastern Alberta (such as the Empress Tipi Rings) (Reeves 1977). These data suggest a direct linkage between Avonlea in the southwestern Alberta and northern Montana Rockies and the Tobacco Plains Phase. Lithic continuity is maintained, while the technology changes from a highly controlled microlithic core/blade technique to a more generalized microlithic bifacial core/flake with considerably more variance in product output, form, style and quality.
>
> A linkage can also be derived between Avonlea and Old Woman's in the development therein of the highly evolved split pebble technique in sites such as Ross (Forbis 1958), Hartell Creek (Murray <u>et al</u> 1976) and Sammis (Milne-

Brumley 1978). This is a development characteristic of Late Old Woman's occupations, ca. A.D. 1200+, and the introduction of more finely finished Plains Side-notched points which appear after ca. A.D. 1200 - 1300 in the kill sequences succeeding the earlier Plains/Prairie styles.

The linkage here extends back to the Besant Phase, and to Early Old Woman's which develops out of it ca. A.D. 750 - 800 which, along with Avonlea, is the source of early ceramics in it. As well as the formal/technological links, a continuity in lithic use patterns, preferences can be traced to late Avonlea sites, as represented at DgPl-10 by the "Swan River" chert. Elsewhere in southern Alberta, this is a dominant Avonlea and Old Woman's lithic - in contrast to Besant where it is considerably less common.

In sum, the "model" suggests that Avonlea (mountian variant) is directly technologically ancestral to the Tobacco Plains (Prehistoric Kootenai) and is stongly linked technologically to a "late" Old Woman's (North Peigan?) variant, characteristic of the Alberta Plains, antecedents to which lie in "early" Old Woman's (Blackfoot) and Besant traditions within the northwestern Plains region.

The Old Woman's Phase in this model, while representing the prehistoric Blackfoot/Gros Ventre, can be regionally and temporally segregated into variants which represent the various "tribal" constituents - North Peigan, Blood, Atsina and Gros Ventre, for example.

The association of the traditional Blackfoot bands and territories is well documented historically. No doubt this extends well back into prehistoric times and accounts for the increasingly complex regional picture of the last 1,000 years and the apparently disparent dates and data.

(Reeves 1980:89-90)

This model appears to be the "best fit" for southern Alberta at this

time. As well, other interesting possibilities exist to the south in the western plains and foothills of the Upper Missouri where similar Avonlea/ Old Woman's transition occurs. To the south the presence of defensive sites in Wyoming suggests that inter-societal warfare and resource competition developed between Avonlea and some other groups expanding into the area, perhaps the cultural group represented by the Todd Phase, defined in my dissertation for the Big Horn Basin.

The mountains of northern Idaho are characterized in the Birch Creek Valley by the Blue Dome Phase (Swanson 1972), dated A.D. 400 - 1200. It is characterized by Avonlea points. In a recent examination of Blue Dome, Butler (1981) demonstrates a Fremont association in Blue Domes' basketry. Avonlea sites such as Wardel (Frison 1973) exist on the northeastern edge of Fremont territory, suggesting a relationship exists between Avonlea and the brief Fremont cultural florescence in eastern Great Basin.

Plains origins are generally accepted for Fremont. This is, however, another dissertation in itself. From personal examination, Fremont stone tool technology is of high quality and very comparable to Avonlea. Fremont peoples also utilized bison kills.

SUMMARY

I hope that the preceeding discussion has highlighted some of the more important developments of the last decade in data and interpretation of the Pelican Lake, Besant and Avonlea phases. Spatial, cultural and temporal dimensions and relationships are becoming increasingly complex and require continuing adjustment as our concepts of Northwestern Plains Rocky Mountain archaeology increases.

To conclude this lengthy preface, I cannot but reiterate the final note of my dissertation. Northern Plains - Rocky Mountains prehistory is complex and dynamic. It should not be subsumed into inappropriate cultural constructs developed elsewhere (for example, the Archaic) or blithely dismissed at one time or the other as simple extensions of the Eastern Woodland, Middle Missouri or Great Basin culture area. With publication of my dissertation at long last, hopefully my known and unknown critics will

adjust their sights on some of its more interesting hypotheses - the Besant-Hopewell connection perhaps - and provide substantive data toward a new and better second approximation. This is as it should be if our discipline is to continue to grow. New data will be acquired which will make the next decadenal review significant. Hopefully by then major late Pelican Lake and early Avonlea campsites will have been excavated, analyzed and compared in the western Plains. These are the two most serious knowledge gaps extant today.

CHAPTER ONE

INTRODUCTION

The materials used in this thesis to present a new framework of Northern Plains Prehistory, involve 200 archaeological components, 155 radiocarbon dates covering a 2,000-year period of prehistory over an area of the plains the size of western Europe. This herculean undertaking grew out of an interest in this time period generated during the preparation of my Master's thesis on the Kenney Site (Reeves 1967), a multicomponent winter campsite in southwestern Alberta. The following year I began work at Head-Smashed-In (Appendix I), a bison jump located some 20 miles away from the Kenney Site, and it became increasingly apparent that the Northern Plains sequence was more complex than previously thought. While analyzing the Kenney Site materials in the winter of 1966-1967 I concluded that Besant was a distinctive assemblage in southwestern Alberta and in fact throughout the Northern Plains. Some elements even seemed to be shared with Woodland mounds on the Middle Missouri (Wood 1960) and Woodland materials from Williston (Wood 1956).

Obviously the data did not fit the current model of successive point style horizons. From comparisons with published material I immediately leapt to the conclusions about its origins and linguistic affinity. MacNeish's Lockhart River points (MacNeish 1951) from the Northwest Territories were identical to Besant; the Besant peoples came from the north and were the Athabaskans moving south. I was soon to learn the folly of such simplistic models.

Consequently I decided to study the Besant Phase in the Northern Plains as my dissertation problem. Assisted by grants from the Canada Council and the National Research Council, I began the collection of data, through a 12,000-mile field trip and library research. As work progressed, it became increasingly obvious that strong similarities existed between Besant and Middle Woodland. These would have to be dealt with and would require analysis and reformulation of the relevant Plains Woodland complexes. Similarly in order to trace the origin and demise of Besant, antecedent and subsequent complexes had to be dealt with and integrated into a taxonomic network.

An extremely inconsistent data base covering a time period which saw the rapid introduction of new ideas and possibly peoples into the plains resulted in a huge mass of material to be analyzed and synthesized into a comprehensible structure. The writer had to make certain taxonomic decisions which other workers may find highly unsatisfactory.

However, I believe that the Northern Plains and/or segments of it at various times over the past 10,000 years have, because of the lack of internal environmental and geographical constraints, seen the existence of many uniform cultures. Cultures and populations do change however, and one must construct a viable taxonomic framework to identify and understand this change. Previous workers have tended to rely on projectile points for the ordering of archaeological data in the Northern Plains. It is now preferable to define and study relationships in time and space based upon a larger number of cultural items integrated into some taxonomic scheme.

One may be heretical in proposing phases and cultural traditions covering an area the size of western Europe, or suggesting that two hunting-gathering groups can occupy and move around in the same environment, exploit the same resource base, but maintain separate cultural identities identifiable in the archaeological record, or propose that a population of hunter-gatherers can physically expand in a matter of 200 years over an area of 750,000 square miles of a plains environment, displacing an indigenous culture. However, these propostions, if nothing else should be a stimulus to future research. Contrary to operative models of some workers, artifacts are not the result of an immaculate conception through a superorganic organism. They were fabricated, utilized, and left by people living in extinct sociocultures. It is my firm belief that by utilizing the proper models we, as paleoanthropologists, can travel far in the construction of meaningful propositions on cultural behavior and causality even for the lowest socioeconomic level. This thesis is a hopeful attempt in that direction.

THE AREA

The geographic area under study in this thesis is roughly the northern half of the Great Plains. It includes the Central Plains of Nebraska and the north half of Kansas; the High Plains of Colorado and southeastern Wyoming; the Middle Missouri area of the Dakotas; the Northeastern Periphery of the Dakotas, Manitoba, and southeastern Saskatchewan; and the Northwestern Plains of Alberta, Montana, and Wyoming. The latter three areas may be subsumed under a larger geographical unit--the Northern Plains, which is the principal area of study in this thesis.

Environmentally the Northern Plains can be fairly well defined. It is bordered on the north by the Aspen Parkland of Saskatchewan, Alberta and Manitoba, and the east by the Woodlands of Manitoba, Minnesota and Iowa, on the west by the Rocky Mountain front ranges of Colorado, Montana and Alberta, and the Continental Divide in Wyoming. The southern boundary more or less corresponds to the Pine Ridge Escarpment in southern South Dakota-northwestern Nebraska.

The physiography and environment of the area have been aptly summarized by a number of workers, the most relevant summaries being those of Wedel (1961), Mulloy (1958), and Weaver and Albertson (1956). Two points are worthy of special emphasis, as they may relate to some of the cultural changes occurring during the period 1000 B.C.- A.D. 1000, even though the archaeological data base is inadequate to control for these variables at present.

1. Although the Northern Plains has many overall unifying characteristics, certain restricted environmental areas are atypical, and regional prehistoric nonagricultural cultures within these areas may also be atypical. Examples of these areas are: Cypress Hills, Bear Paw Mountains, Little Rockies, Highwood Mountains, Black Hills, and the xerophytic Big Horn-Wyoming basins. Climatic factors such as the winter chinooks of southern Alberta and Montana may have provided a superior winter habitat for man and bison than the adjacent plains beyond the reach of the ameliorating warm winds (Reeves 1966:7, 169).

2. The edges of the Northern Plains are of potential significance in understanding prehistoric cultural dynamics in the Northern Plains.

Edge adapted cultures may have been transmitting agents for the introduction of new cultural traits into the plains; since they exploit two or more ecozones, they have a relatively high potential to develop new techniques which would have allowed them to expand, dominate, and displace indigenous plains cultures. Further, because of the unstable character of these edges, minor climatic fluctuations may have forced local cultures to adapt to new ecological conditions.

PALEO-ENVIRONMENTS

Because of the general lack of detailed studies of the post-glacial environments in much of the study area, relatively little can be said with regard to environmental fluctuations during the period 1000 B.C.-A.D. 1000.

Vegetation established itself soon after recession of the last Laurentide advances. Because the central area of an ecozone is more stable than its edges, the Parkland belts of the Northern Plains are more sensitive in the study of Post-Glacial Environments; consequently past research has centered on these areas. Only minor fluctuations have occurred since the establishment of vegetational boundaries (Ritchie 1967) in the Sub-Boreal period ca. 2500-2000 B.C. Bryson and Wendland (1967) consider these shifts to be best viewed as small fluctuations from our present climate. The three largely hypothetically climatic periods relevant to this study are:

1. Sub-Atlantic 550 B.C.-A.D. 400

   The position of the Boreal Forest remained stable, but the forest became much wetter, resulting in the growth of blanket peat or "upland muskeg". Summers are considered to have been cloudier and wetter, and winters are colder and stormier, with the westerlies pushed far to the south. These conditions resulted in the "reforming" of the glaciers south of 50° N and a partial return to a late glacial climate.

2. Scandic 400-900 A.D. represents a return to conditions similar to the Atlantic.

3. Neo-Atlantic 900-1200 A.D.

Summer rains increased, glaciers "disappeared," Boreal Forest expanded in both directions, and the prairies shifted westward at the expense of the steppe.

During these climatic periods we should expect shifts in the Parkland edge. Unfortunately the Alberta pollen profiles (Hansen 1949) are not chronologically controlled at this position.

The glacial period during the Sub-Atlantic is the Temple Lake Stade (Richmond 1965). Richmond's chronological control is based on dates from stream and river alluvium which presumably correlate with Temple Lake moraines. However, until dates are obtained on organic matter incorporated in Temple Lake glacial deposits, the age of the stade cannot be satisfactorily determined. The increased snow pack, regenerated alpine glaciers and colder stormier winters during this time may have had significant effect on populations resident in the northern Rockies and along the Parkland edge.

SYSTEMS ANALYSIS

A brief discourse on systems analysis will acquaint the reader with my theoretical orientation to the analysis of archeaological data even though it is impossible to apply the standards set forth here in the thesis. It is nonetheless important to record the theoretical frame within which I operate. It should be noted that although this approach is only superficially outlined, it has developed independently of other systems approaches to prehistory (such as Binford's) and is derived basically from the Parsonian Sociological School.

A system may be defined as a complex of interacting elements. Systems may be hierarchically organized into oversystems, supersystems, systems, and subsystems. One may have systems within systems depending on the referent point of analysis. If one is analyzing various cultural systems, i.e. economic, religious, and political, in terms of the working of the whole we may refer to them as subsystems in reference to the

cultural system. If, however, one is analyzing these subsystems in reference to the internal or external interactional patterns we may refer to them as lower order systems.

The universal oversystem is conceived of as being divisible into two analytic-empirical supersystems, the sociocultural and the environmental. The sociocultural is comprised of two major systems, the social system and the cultural system (Kroeber and Parsons 1958; Parsons 1961). The cultural system or "culture" is defined as "transmitted and created content and patterns of values, ideas and other symbolic meaningful systems as factors in the shaping of human behavior and the artifacts produced through behavior. . . ." The social system designates "the specifically relational system of interaction among individuals and collectivities" (Kroeber and Parsons 1958:583).

Laura Thompson further defines a particular system as a

> community's distinctive human way of transacting with its total effective environment--the culture's uniqueness is a function of the unique transactive situation of the human group owing to (1) Its own unique genetic and pyschosomatic compostion; (2) Its unique ongoing culture history; (3) The unique and changing biotic supercommunity, wherein the human community constitutes one component; and (4) The unique and changing geophysical base of the supercommunity, including its changing climate (Thompson 1961:160).

The environmental supersystem is conceived of as containing both closed inorganic and open organic systems, i.e. static versus dynamic equilbrium systems (Thompson 1961:98). Crosscutting these open and closed systems is the ecologic system. When working from the reference point of single cultural system, the effective environment, which includes other cultural systems, constitutes the analytic unit.

Conceptually, at least four major frames of reference should be utilizied in a systems approach to prehistory:

1. The interactional patterns between the non-cultural systems of the effective environment.
2. The interactional patterns between the systems

of the effective environment and the cultural systems under consideration.

3. The interactional patterns between the cultural subsystems.

4. The interactional patterns between the cultural system and the social system.

The analysis should proceed both on the descriptive and interpretive level. For the analysis of prehistoric cultural systems, a number of analytic subsystems can be proposed. Conceptual subsystems used in this thesis are the artifact system, settlement system, subsistence system, and burial system. These systems are described for each phase and phases are compared. Because of the variable nature of the data, no detailed study can be undertaken of their interactional patterns in space-time as it relates to the effective environment exclusive of the other cultural systems existing in it.

The Artifact System

The artifact system is the most useful for the study of the internal and external interactional patterns of the prehistoric cultural systems under consideration. The artifact system is conceptualized as containing a number of major form-function systems. The separation of these analytic systems can usually be done on observable differences in form-function.

Examples of such systems are the ceramic system, the projectile system and the end scraper system. One item may function in more than one system. Within these systems, cultural-formal types (maximal meaningful attribute clusters) can be constructed by the statistical manipulation of attributes (minimal meaningful cultural units) and interactional patterns can be studied at any level within the artifact system.

Meaningful statistical manipulations would require either the use by all workers of a standardized descriptive and typological system or the availability of all material for loan and hand specimen examination by the writer. Since neither of the requisite conditions can be met in this study, meaningful statistical manipulations are not now feasible.

Other Systems

Other conceptual systems are of varying utility. Differential preservation of faunal and floral materials greatly affects statements on subsistance and settlement patterns. The understanding of the burial systems is biased by the small sample sizes which represent only part of the population at any one time. Ideally one can study by statistical means the interactional patterns in space-time of the above conceptual systems. For the same reasons as cited before such a study cannot be undertaken in the present thesis.

HISTORICAL BACKGROUND

In 1933 William Duncan Strong said, ". . . Considering the emphasis placed on the ethnological studies among many tribes of the Great Plains it is surprising that so little archaeological research has been accomplished in the area." For many of these areas his statement still holds true today.

While considerable field work has been undertaken since 1933, it has been spotty in coverage for the regions outside the Middle Missouri and Central Plains, where, there the focus has been on the last 1,000 years. For the Plains the attention of both the profession and the public alike has focused on the Wonderful World of Early Man with the result that in textbooks such as Willey (1965) or Jennings (1968) the Early Man Plains Big Game Hunters receive a great deal of attention but the rest of Plains Prehistory is summarily dealt with at best.

The following discussion briefly summarizes previous research and archaeological units utilized in the area and the period under study in this thesis. Wedel (1961), Caldwell (1968) and Mayer-Oakes (1969) provide additional historical detail. For convenience these schemata are summarized in Figure 1. Mulloy's (1958) trinomial system of the Early, Middle, and Late Prehistoric periods is utilized in this study (p.40).

Central and High Plains

Strong's (1932, 1933, 1936) Signal Butte excavations are the earliest research in the Plains relative to this study. While the complete analysis still remains to be published (Forbis n.d.) it is still the only large preceramic sample for this period. Other early reports are Renaud's (1934) survey and Bell and Cape's (1936) report on rockshelter excavations in western Nebraska.

Strong (1933:Table 1) presented a classification, the first, for Plains complexes. The sequence is divided into three major periods--Historic, Protohistoric, and Prehistoric. The Prehistoric includes both ceramic and preceramic cultures. Signal Butte I and II are placed in the latter. Strong also used this basic periodization in his 1935 monograph (Strong 1935:Table 7). Following the lead of Wedel (1934) he classifies (Strong 1935:2) the materials from Nebraska and Colorado into the McKern System. Two "basic cultures," the Great Plains and Mississippi are proposed. Signal Butte I and II are assigned focus and aspect status. They are placed, along with the Folsom Aspect, in the Early Hunting Phase of the Great Plains Culture. Woodland materials, which consisted at that time of only Walker Gilmore, are classified into the Sterns Creek Focus of the Iowa "Algonkian" Aspect of the Woodland Phase, Mississippian Basic Culture. Strong (1935:1) considers his use of culture to be equivalent to aspect. Subsequently, Wedel (1940:Figs. 21, 22) divided Strong's Prehistoric into the Late Prehistoric (includes the Central Plains and Middle Missouri Phases), Woodland Pattern and earlier preceramic materials such as Signal Butte I and II. In 1941 Hill and Kivett utilizing the MTS, elaborated on the Woodland Pattern by defining the Valley Focus on the basis of their excavations at the Schultz Site. MTS classification of Nebraska Woodland reached its present form with Kivett's formal definition of the Keith Focus and the taxonomic placement of it and Valley in the Orleans Aspect of the Plains Woodland Phase, Woodland Pattern (Kivett 1952, 1953). The Loseke Creek Focus (Kivett 1952) is assigned only to the Plains Woodland Phase. The definition of these foci today still rests to a large extent on these publications. Medicine Creek, a major

Keith habitation site excavated in the 1940's, still remains unpublished.

In western Nebraska, Champe (1946:Fig. 17) on the basis of his excavations at Ash Hollow developed a scheme which was a marked improvement on the earlier ones and for that matter on some of the subsequent ones. He proposed three major periods--Historic, Ceramic, and Lithic. The Lithic was subdivided into Early Man and Intermediate. The Ceramic was divided into three major periods--Early (Woodland), Middle (Upper Republican, Nebraskan), and Late (Dismal River, etc.).

In the Colorado foothills the first major studies are LoDaiska (Irwin and Irwin 1959) and Magic Mountain (Irwin-Williams and Irwin 1966). In these reports they define site complexes, discuss relationships and outline the prehistory of the foothills. Subsequently Irwin-Williams (1967) considered the Magic Mountain-Apex complex as a northern variant of Picosa, "The Elementary Southwest Culture." In the adjacent plains Withers (1954) proposed a number of foci--Parker, Graneros (Woodland) and Franktown (Upper Republican-like). These have yet to be fully characterized. The Irwins on the basis of excavations at Agate Bluff (1957), proposed the Ash Hollow Focus for the Ash Hollow, Agate Bluff, and Kelso Woodland components. J. J. Wood (1967), on the basis of work in northeastern Colorado, established a radio-metrically controlled sequence. He proposed two major periods--the Preceramic and Ceramic, each of which is divided into Early, Middle, and Late. Wood equates his Middle Preceramic to Mulloy's (1958) Early Middle Prehistoric, and his late Preceramic to Mulloy's Late Middle Prehistoric. Woodland is placed in the Early Ceramic and Upper Republican in the Middle Ceramic. Wood also substitutes the term phase for focus for all the Woodland foci mentioned above.

Middle Missouri

Most taxonomists in the Middle Missouri have been concerned with post Woodland problems and Woodland and preceramic materials have received little attention. Strong (1940) applied his trinomial system to the Northern Plains and Wedel (1949) included it in his overall correlation. More recently Lehmer (1954) defined five horizons--Early Hunting, Foraging (post-Altithermal), Plains Woodland, Sedentary, and

Equestrian. Outside the Middle Missouri Lehmer characterizes late groups as Hunter-Gatherers. For the few preceramic remains described in the literature Irving (1958) and Neuman (1964) both used Mulloy's (1958) Early and Middle Prehistoric scheme.

Black Hills

In the Black Hills area, little work has been published. Hughes (1949) established a series of foci on the basis of survey work in the Angostura Reservoir. Of these, the Limestone Butte and Sheps Canyon, are relative to this study. Wheeler (1958) utilizing data from subsequent excavations placed the components in Mulloy's trinomial scheme.

Manitoba

Mayer-Oakes (1967) recently summarized the history of research and the various taxonomic schemes developed in Manitoba. Vickers (1947, 1948, 1949, 1950), on the basis of surveys and excacation established a series of foci. The Rock Lake and part of the Lakeshore (preceramic) are relevant to the present study. Joyes (1967) reanalyzed Vickers' data and collected additional material from the Avery Site. In southeastern Manitoba, MacNeish described and integrated a number of excavated components into a series of foci of which Larter, Anderson, and Nutimik are utilized in this study.

Saskatchewan

In Saskatchewan, Wettlaufer (1956) in the Mortlack Site report integrated his excavated components into a series of eight "cultures." Later at Long Creek (1960), he establiched another series of "cultures," some of which were the same as at Mortlack (Besant and Pelican Lake). These names were also used by Wettlaufer for the characteristic projectile points found associated. In the most recent summary the Kehoes (1968) present no formal scheme.

Alberta

Wormington and Forbis (1965) proposed a trinomial scheme designated as Paleo, Meso and Neo-Indian for Alberta. These units are equivalent to

Mulloy's (1958) Early, Middle, and Late Prehistoric. Forbis (1968) uses Mulloy. Recently I have utilized Mulloy's basic scheme and further divided the sequence in southern Alberta into complexes, phases, and cultural traditions.

Montana and Wyoming

In comparison to the rest of the Northern Plains, serious excavations began in Montana in the late 1930's with the excavation of Pictograph Cave, the Billings Bison Trap, and other sites. Since this early work carried out by Mulloy and Oscar T. Lewis, archaeology has languished until taken up by serious amateur groups in the state in recent years. For northern Montana, Davis (1968) divides the sequence into the Early, Middle, and Late periods, divisions which are equivalent to Mulloy's.

In southern Montana a variety of schemes most of which are variants on Mulloy's have been utilized. In 1953, Mulloy proposed the Early, Middle, and Late periods. Subsequently in his dissertation submitted in 1953 and published in 1958, the terminology was changed to the Early, Middle and Late Prehistoric periods. This designation first appears in print in the McKean report in 1954. Malouf (1958) proposed an Early Hunter, Forager, and Late Hunter scheme, dividing the Late Hunters into two phases, the first equivalent to Mulloy's Late Middle Prehistoric and the second to his Late Prehistoric. Malouf's other two units are equivalent to Mulloy's Early Prehistoric and Early Middle Prehistoric respectively. In 1960 Malouf divided the Early Hunters into two phases. Taylor's (1964) scheme is a mixture of both Malouf and Mulloy. Taylor utilizes the Early Prehistoric (equivalent to Mulloy's Early Prehistoric), Middle Prehistoric (equivalent to Mulloy's Early Middle Prehistoric), and the Late Hunter (equivalent to Malouf's Late Hunter). Following the trend, Napton (1965) divided the sequence into Paleo-Indian, Early (equivalent to Mulloy), Middle (equivalent to Taylor), and Late (equivalent to Malouf). The early part of both Taylor's and Napton's last period is equivalent to Mulloy's Late Middle Prehistoric. Hoffman (1961) managed to stay with Mulloy but assigned a strange set of dates. A note of sanity

finally appears with Arthur's (1966) correct use of Mulloy's terminology (see also Arthur 1968). In Wyoming Mulloy's terminology has been widely used by amateur and professional alike. Wheeler (1958) modifies it slightly for classification of the materials in the Boyson and Keyhole reservoirs.

General Schemes

With the exception of Mulloy (1958) and Wheeler (1958), the various taxonomic systems discussed above have been devised for specific regions of the Plains. Lehmer's horizons have previously been mentioned. Wheeler's cross-correlation of materials from the Boysen, Keyhole, and Angostura reservoirs and general synthesis of the Northern Plains remains incomplete and unpublished; this is indeed unfortunate as it constitutes one of the major sources of factual information.

Using the Historic, Protohistoric, and Prehistoric periods Wedel (1949) attempted a cross-correlation for the northern half of the Great Plains. In his article he correlated Pictograph Cave II, Signal Butte II, and Ash Hollow. From Wedel's Fig. 83, these presumably equate temporally with Plains Woodland and Hopewell.

Later Wedel (1961:Fig. 25) cross-correlates components and foci. He proposes these basic patterns--Early Big Game Hunters, Post-Altithermal Hunters and Gatherers (including Plains Woodland foci), and subsequent Nomadic Bison Hunters in the west and Plains Village Pattern in the Middle Missouri and Central Plains.

Mulloy's study (1958) is the first detailed correlation of components and complexes in the area. He hoped to establish by trait list comparisons "region wide, horizon style complexes . . . a series of periods . . . region wide material cultural items characteristic of each" (Mulloy 1958:140). Mulloy's study concentrated on the Middle and Late Prehistoric periods. Within the Middle Prehistoric he defined two subunits designated as Early and Late. In his study he utilized sites such as Ash Hollow, Signal Butte, Angostura Reservoir, Ludlow Cave, McKean, Billings Bison Trap, Emmigrant, and others. He also integrated Great Basin sites such as Deadman, Promantory, and Black Rock caves.

From the above discussion it is obvious that most major schemes have been based on a trinomial division of time. Although some workers would argue that the tripartite division is artificial and unnecessary, I disagree, for if properly utilized it allows for the rapid communication of a minimum amount of data. This is useful in the Plains where because of ecological-geographical factors, there was probably a considerable degree of homogeneity at any one time. Since Mulloy was the first to define in detail horizon styles on a broad temporal basis, his terminology and tripartite division is followed in this study.

Since Mulloy's original formulation new data have been acquired which allow for, and require further refinement of Mulloy's definitions. Further, Mulloy's definitions have come to have socioeconomic implications associated with them which were not part of the original horizon style designation.

To characterize each of the three periods I propose that two variables be utilized--time and an easily recognizable and widespread technological trait.

1. Early Prehistoric ca. 10,000 B.C.-ca. 5500 B.C.

Archaeological units characterized by projectiles or projectile point systems presumably designed for use as or on a heavy spear, of the type usually used for throwing or stabbing. Complexes such as Clovis, Folsom, Agate Basin, Cody, Frederick, and Lusk are included. Point types in these systems are variations on lanceolate preforms.

2. Middle Prehistoric ca. 5500 B.C.-A.D. 200-700

Archaeological units characterized by projectiles or projectile point systems presumably designed for use with the spear thrower (atlatl). Complexes known for the plains include Plains Archaic, Oxbow, McKean, Duncan, Hanna, Pelican Lake, Besant. Point forms include a variety of unnotched, stemmed, and notched forms.

3. Late Prehistoric Period A.D. 200-700-A.D. 1725

Archaeological units characterized by projectiles or projectile point systems presumably designed for use with the bow. Point forms

include a variety of unnotched, stemmed, and notched forms. Complexes, phases, and point types occur in profusion in this period.

Further subdivision of these three major periods is debatable. Mulloy divided the Middle Prehistoric into the Early and Late periods. The Early Middle Prehistoric was characterized by side notched, basal notched (McKean Lanceolate), stemmed, and unnotched forms dating ca. 3000-1500 B.C. Since Mulloy's definition, components have been found that date from 5500 B.C. and are characterized by side notched points often with minor frequencies of corner notched and stemmed forms (e.g. Mummy Cave). Clearly, if we adhere to Mulloy these do not fall within his definition of the Early Middle Prehistoric period, consequently in order to use it we shall have to redefine it to include these earlier complexes.

Mulloy's Late Middle Prehistoric primary diagnostic were corner notched points (known as Pelican Lake Corner Notched in this study). It is now known that other point types including side notched, unnotched, and stemmed forms may occur associated. For Mulloy's designation to be useful it must be redefined to include these other forms.

I hereby propose that Mulloy's definitions for these two periods be amended in the following fashion:

<u>Early Middle Prehistoric ca. 5500 B.C.-ca. 1500 B.C.</u>

Archaeological units characterized by specific types of side notched, stemmed, and/or basally notched atlatl projectile points. Minor frequencies of unnotched and corner notched forms are also associated. Types present include Bitterroot Side Notched, McKean Lanceolate, and Oxbow.

<u>Late Middle Prehistoric ca. 1500 B.C.-A.D. 200-700</u>

Archaeological units characterized by specific types of corner notched, or side notched atlatl projectile points. Minor frequencies of stemmed and unnotched forms are also associated. Types present include Hanna Corner Notched, Besant Side Notched, and Pelican Lake Corner Notched.

ARCHAEOLOGICAL UNITS AND METHODOLOGY

Previous work in the area under consideration has either been specific, in the case of individual site or locality reports, or extremely generalized, in the case of the various classifications discussed in the preceding section. I propose to take all available, usable data and order it along somewhat different lines in an approach that is, in some respects, intermediate between the specific and generalized. This involves ordering components and other archaeological units used by various investigators into subphases and phases which are in turn combined into cultural traditions that I believe reflect some sort of identifiable and viable cultural reality, the nature of which is discussed later in this study. Thus, whereas the previous generalized attempts to deal with Northern Plains Prehistory utilized a broad horizontal ordering with temporal significance, I am making an effort to introduce other meaningful dimensions that give us more refined archaeological units to consider. My scheme is offered with full realization that the base data are less than ideal in regard to coverage and comparability.

The domain of archaeological terminology is one that could occupy an entire treatise, and it is certainly an area in need of constant review and consensus. Perhaps one of the most pressing needs of anthropology in general, and archaeology in particular, is the need for truly comparable units. Lacking that, each archaeologist should make explicit his use of familiar terms, for in actual fact many archaeologists use terms like phase, component and tradition, but many kinds of units are actually meant by these terms.

Willey and Phillips' recent book has had a decided effect in shifting New World archaeologists to their selection of terminology for archaeological units, especially those of lower rank. This is extremely evident in the Plains in the rather wholesale use of phase (citing the Willey and Phillips definition) in recent publication, thereby surplanting the older McKernian focus. I follow this trend, and start with the Willey and Phillips definition of the phase unit, but with certain qualifications that are explained below.

The Use of Phase in this Study

Following Willey and Phillips (1958:72) a phase is "An archaeological unit possessing traits sufficiently characteristic to distinguish it from all other units similarly conceived whether of the same or other cultures."

They further state that a phase may represent anything from a brief occupation of a camp to a prolonged occupation of a "number of sites distributed over a region of very elastic proportions," and that "there are so many variable conditions entering into the formulation that it is neither possible nor desirable to define the scope except within rather braced limits." In general Willey and Phillips believe that phases correlate with localitites or regions. However, in this study (by the process of integrating components into phases) a phase often assumes larger proportions in my scheme.

Subphases are divisions of a phase useful in studying the internal variation within a phase and the relationship of a phase to other serial and coeval phases of the same or other traditions.

My use of pnases and subphases differs from Willey and Phillips primarily in order of magnitude, in at least some cases. This is, I believe, jsutified by the nature of the material and by the lack of terms for archaeological units of the sort I am working with here. The nature of the environment of the Northern Plains, the lack of geographical barriers to the movement of people and the diffusion of ideas and actual items, the similarity of exploitation of the environment may well mean that the units at the phase level will be larger in the Plains than in other culture areas. This, coupled with the paucity of archaeological work, and the preliminary nature of this study, seem adequate justifications for my use of phase and subphase. In my scheme, a phase does not necessarily correlate with a locality, region, or even an area. The area occupied by a phase may change through time and it may in fact be found in two environmentally distinct areas.

Use of the Term Tradition in this Study

To Willey and Phillips (1958:37), an "archaeological tradition is a

(primarily) temporal continuity represented by persistent configurations in single technologies or other systems of related forms." From this definition it follows that a variety of traditions may be postulated, e.g. technological traditions, various formal artifact traditions, settlement traditions, ceramic traditions, subsistence traditions, and burial traditions. This definition overlaps to a considerable degree with what I have called systems.

I prefer to define a cultural tradition as persistent configurations in a number of cultural systems (to use my terminology) which interact to produce an archaeological unit distinct from all other archaeological units conceived on the same criteria. The cultural traditions thus serves to articulate phases that I judge to be related into an ongoing space-time cultural continuum. In order to avoid confusion between my use of cultural tradition and other usage of the term tradition, reference will always be made to a specific cultural tradition such as TUNAXA.

Unlike the phase concept, which has been widely applied on the Plains, the idea of identifying cultural traditions as very long-lived units composed of related phases and subphases is new. The use of this concept of a cultural tradition gives increased power for the understanding of the relationships between prehistoric cultures.

If one does not use all the data possible in the formulation of a cultural tradition it is probable that significant differences will be obscured in comparisons between serial or coeval phases of adjacent cultures. If, for example, one used the subsistence base as the sole criterion to characterize the prehistoric cultures of the Northern Plains, one would divide the phases described in this study into three cultural traditions. One would be characterized by communal bison hunting (Mortlach, Larter, Keaster, Upper Miles, Badger, Besant, and Avonlea). Another would be characterized by hunting-gathering-horticulture (Valley, Loseke, Keith, Parker, Willowbrook) and the other by generalized hunting-gathering (Glendo, Spring Creek, and Keyhole). The subsistence base, however, relates primarily to environmental variables and the extractive capability of the culture. Segmentation of an ongoing

cultural tradition into serial phases must remain somewhat arbitrary. Generally the time-space diagnostic items used here are ones which are introduced into ongoing artifact systems. For example, the Pelican Lake Phase of the TUNAXA cultural tradition is separated from the Hanna Phase on the basis of the dominanace of Pelican Lake Corner Notched points over Hanna points. Other items such as drill types or uniface types do not change.

Techniques of Setting Up Phases and Cultural Traditions in this Study

Without going into detail, the writer feels that the sample size, both qualitatively and quantitatively, is inadequate to undertake statistical manipulations of the data for the definition of phases and cultural traditions. The techniques used in this thesis for integrating components into phases, phases into cultural traditions, and organizing data for use in inter- and intraphase comparisons include simple ones of differential frequency distributions and the presence-absence of certain traits. Possibly some of my phases or cultural traditions are either too large, and should be split or too small and should be lumped. In certain instances I would be in full agreement, in other cases if one accepts certain basic assumptions outlined below, then my groupings should necessarily follow.

Some cultural items and systems are emphasized at the expense of others. These are the ones which have proved pragmatically most useful in charaterizing the phases and studying their intergroup relationships. Since more data are extant on the artifact system, it receives more emphasis. Within it, projectile points, bifaces, end scrapers, drills, perforators and gravers, unifacial tools, choppers, certain ground stone items, and ceramics receive the most attention. Items such as marginally retouched flakes, bone and shell tools and ornaments and lithic manufacturing techniques were not particularly useful as either their occurrence was too sporadic or descriptions were totally inadequate. Settlement system features such as hearth and cache pit types were useful as were the basic subsistence systems. In contrast, neither house types nor butchering techniques are used. In the first case the sample is too

small and in the second, the behavior pattern is rarely described. Burial systems, although probably of considerable significance, have been underemphasized because of the insufficient data presently available. Similarly, the associated grave goods have not been included in the general analysis.

Between each component, trial types (established on the basis of formal variation), attribute clusters and certain attributes were compared to establish their distributions and associations. When the frequency of a group of items decreased markedly or disappeared, a tentative phase boudary would be established. If this change included a large number of items then these distributions were assumed to delineate phases of separate cultural traditions. When only a slow rate of change occurred and there was no major disconformity of traits, it was assumed that the phases were of the same cultural tradition.

The underlying assumption is that components are assumed to represent residential groups which change in composition over space and time. The phase represents a social-cultural group as a definable entity in space over a period of time. Although the population may shift within the groups, the common social, cultural, and genetic bonds result in formal types having a higher frequency occurrence within than between groups. Certain other items will show continuity only within one group even though their distribution may be sporadic. Regional phases or subphases of the same cultural factors controlling interaction patterns which results in increased variance between in-group and out-group contact.

Serial phases of the same cultural tradtion are separated by the use of items exhibiting fast rates of change and rapid diffusion throughout the area. Other items may or may not change at the same rate. Projectile points and ceramics were most useful in this study to define sequent or regional phases of the same cultural tradition.

Certain basic forms, often including the types used to characterize sequent phases of a cultural tradition participate in a multidimensional functional network, occupying symbolic positions in the cultural ideological system. These items may be retained in a basic format within the

tradition for millenia. When they suddenly disappear or show a marked frequency shift accompanied by the introduction of a number of new functionally equivalent items we may assume the indigenous cultural tradition has been replaced.

In sum, sharp differential frequencies and presence-absence of traits serve to isolate phases of separate cultural traditions in space and time. A slow rate of change or item replacement serve to separate phases of the same cultural tradition. Large scale replacement is interpreted as signaling the beginning of a new cultural tradition.

Cultural systems interact with the effective environment. We should expect more similar items to appear in adjacent rather than in distant cultural traditions. In evaluating this situation one must consider three major variables. (1) Does the item in question represent contact and transmission of the item from a donor to a recipient culture? (2) Or, is the presence of the item in the two phases a result of common heritage from an ancestral cultural tradition? (3) Or, does the item in question represent a similar response to a generated need? Aside from specific items of material or manufacture, which could only be the result of contact between two or more groups, the evaluation of the three variables must rest on the propositions discussed previously. If the sequence is reasonably complete we will probably be able to determine whether or not the two phases had a common cultural heritage at some time previous. The chance of a form-fuction item representing a similar response is low when two phases are adjacent. They may both have similar needs, but useful new traits would quickly diffuse rather than develop independently in each.

The items which appear in adjacent phases of different cultural traditions which are used to indicate contact are, aside from trade items, specific idiosyncratic formal types which normally only occur with any frequency between components of the same cultural tradition or phase.

Two other cultural interaction models require consideration: (1) divergence from a single cultural tradition resulting in two or more new discrete cultural traditions, and (2) the integration of two cultural

traditions resulting in a new and discrete cultural tradition. The first process is the result of decreased interaction between segments of a phase, and is observed through time by increasing divergence in the cultural systems--with fewer items being shared or transmitted between the two mutually culturally isolating populations. Reversing the time line results in the convergence of two formally distinct cultures to form a qualitatively new cultural tradition. In both cases, by observing the process through time, their former relatedness or unrelatedness will be observable. More or less interaction results in the increased or decreased flow of form-function types. Correspondingly, changes of their previous functional and symbolic positions occur, resulting in the development of new formal types through the reintegration of attributes present in the parent systems and the differential acceptance of new attributes and types.

Phases and Cultural Traditions Used in this Study

Through the methods outlined above, eleven phases and eight subphases are developed and placed in four cultural traditions. The time lines of the latter are not traced or discussed in any detail, except for the period under study. The phases include both new formulations and recombinations of previous foci, complexes, and phases proposed by other workers. Whenever possible old names have been retained, but all such units have been redesignated phases or subphases as the case may be. Figure 2 diagrams the relationship of the phases and cultural traditions used in this study.

The name TUNAXA is proposed for a Plains cultural tradition extending from the Middle to the Late Prehistoric period. TUNAXA is a Kootenai word used to refer to themselves, their ancestors, the people, other people, a place, or an extinct band. The word as used herein refers to the people. The TUNAXA tradition includes both sequential and regional phases and subphases. McKean, Hanna, and Pelican Lake each containing many regional subphases, belong to the Middle Prehistoric. Avonlea, Keyhole, and Patten Creek belong to the Late Prehistoric. Hanna and McKean precede the period under study and are not considered in this

thesis. The name Pelican Lake is taken from Wettlaufer's (1956:60) Pelican Lake "Culture" defined at Mortlach and Long Creek. My phase definition bears little resemblance to the original. The subphases within Pelican Lake are Glendo, Badger, Upper Miles, Spring Creek, Keaster, Blue Slate Canyon, Mortlach, and Larter. With the exception of Larter--originally defined as a focus by MacNeish (1958)--all are new names and formulations.

In terms of previous classifications, Pelican Lake is in part equal to Mulloy's and Wheeler's Late Middle Prehistoric, Champe's Intermediate Lithic, and J. J. Wood's Late Preceramic. Avonlea is an enlargement and restatement from the Avonlea "Culture" defined by Wettlaufer (1960). Keyhole and Patten Creek are new names and formulations.

NAPIKWAN is proposed as the name for the second Plains cultural tradtion which includes the Besant and Old Women's phases. NAPIKWAN is the Blackfoot word for Old Man Person. It was commonly used to refer to white men but may also refer to Napi the Blackfoot creator. The word as used herein refers to Old Man Person. There is no a priori association between the use of these words for naming cultural traditions and the Blackfoot or Kootenai as historic linguistic groups. Algonkian or Kootenian Prehistory is not the concern of this study but interesting avenues of speculation lie in that direction. Old Women's is a phase of the Late Prehistoric period in the Saskatchewan Basin and is not discussed in any detail in this study. The Besant Phase is named from the Besant Culture at Mortlach (Wettlaufer 1956) however, my definition bears little resemblance to Wettlaufer's construct.

Two other cultural traditions are represented by the Plains "Horticultural phases" of Valley and Loseke Creek, and Keith. The definition and description of these phases is essentially an enlargement and restatement in study systematics of the original definition (Hill and Kivett 1940, and Kivett 1952, 1953). These two cultural traditions are conceptualized as developing out of indigenous TUNAXA populations, under the pressure of influences from the eastern Woodlands.

The Willowbrook Phase is defined for the Colorado foothills. I have

separated it out of the termianl portion of the Apex complex (Irwin-Williams and Irwin 1966), a northern variant of the Picosa Culture (Irwin-Williams 1967). A sequent phase in the foothills and on the adjacent plains is the Parker Phase, which was designated as a focus by Withers (1954) and redesignated as a phase by J. J. Wood (1967). The present definition is a restatement and enlargement of Wood's concept. Ash Hollow, originally designated as a focus by Irwin and Irwin (1957) and changed to a phase by Wood (1967), is a partially sequent phase in northeastern Colorado-southeastern Nebraska. It and Parker are considered in this thesis as phases of an unnamed discrete cultural tradition that developed out of an amalgamation of the Glendo Subphase in the Plains and the Willowbrook Phase in the foothills. The Todd Phase, proposed for the Late Prehistoric of the Big Horn-Wyoming Basin, is conceptualized as belonging to a foreing (unnamed) cultural tradition moving into the area from west of the divide.

A number of lithic artifact types are also defined or redefined. Whenever possible old names are retained. Binominal terminology has been used for projectile point types and some hafted biface types. Old types redefined in this study include Hanna Corner Notched, Pelican Lake Corner Notched, Besant Side Notched, Samantha Side Notched, and Columbia Valley Corner Notched. New types, names, and definitions include Timber Ridge Side Notched, Head-Smashed-In Corner Notched, Parker Corner Notched, and Ruby Corner Notched. As in the case of other taxonomic units, the order of magnitude that I include in the <u>type</u> is not necessarily the same as other investigators. For example, the Pelican Lake type is a corner notched atlatl dart point. Within this single type, I have isolated 48 subtypes and subsumed corner notched points previously assigned to other types by other investigators. All formal artifact types are capitalized.

The relationships between Besant, Pelican Lake, and Avonlea are the major concern of this thesis. TUNAXA is conceived of, in the Pelican Lake Phase, as consisting of a series of regionally adapted societies, all participating to a greater or lesser extent in a common

cultural tradition present on the Plains for at least two and one-half millenia. The NAPIKWAN tradition, appearing on the Middle Missouri at ca. A.D. 1 as the Besant Phase, either develops out of a regional sub-phase of the Pelican Lake Phase or is intrusive from the eastern fringe of the Plains. It spreads west into the Upper Missouri and Saskatchewan Basin, briefly displacing the TUNAXA populations from part of the area. The TUNAXA tradition reappears in the northwestern area at ca. A.D. 200 as the Avonlea Phase. Besant and Avonlea maintain their separate identity over some 500 years with Besant developing into the Old Women's Phase and Avonlea being displaced from the Saskatchewan Basin.

Tables 1-10 list the components according to the phases to which they have been assigned. Two alphanumeric keys are used. One indicates whether the writer observed the artifacts personally, or whether a published or unpublished report was used. The other indicates the possibility of stratigraphic mixing of the component.

The data used in the construction of phases were of varying usefulness. Some collections were temporarily or permanently housed at The University of Calgary whereas in other cases, photographic records and notes made by the writer were utilized. For other materials, published of unpublished reports or personal correspondence were the sole sources available. The items which the writer feels may be particularly diagnostic in characterizing each phase are summarized in the relevant sections of Chapter 11.

Tables 29-41 present data for the components and phases. The phases so constructed are also summarized with additional information on spatial distribution and on the usefulness of certain components in Chapters 3-10. Figs. 3-6 visually illustrate the spatial dimensions of the phases, and Appendix II discusses the relative and absolute dating methods used to arrive at the temporal distribution of the phases, which is summarized in Fig. 7. Radiocarbon dates listed in Tables 21-25, are graphed in Fig. 24. Lithic artifact typology is discussed in the next chapter.

Chapter 11 includes a brief summation of the characteristics of each

phase, the integration of phases into cultural traditions, a comparison of these phases and traditions and a search for origins and relationships. The dissertation concludes (Chapter 12) with an attempt to explain the dynamics of some of these cultural traditions. Appendix I provides a brief description of undocumented sites.

CHAPTER TWO

TYPOLOGY AND CLASSIFICATION

This study is an attempt to view the prehistory of the Northern Plains in a more dynamic framework than has previously been attempted. As such, the basic problem is typological--the ordering of qualitatively and quantitatively varying data, most of which has been collected by other investigators.

Artifact types and other cultural types are the basic units utilized in integrating components into phases, phases into cultural traditions, etc. No serious attempt is made to manipulate artifacts through multivariate techniques in order to arrive at the best of all possible typologies for the period under study. Such an exercise would require detailed inspection of all artifacts utilized in this study--a far too time-consuming task.

The basic assumption is that certain attributes, primarily those of form, will show differential frequency distributions that are useful for studying culture change and defining archaeological units. Examples of these attributes include the shape of a butt of a drill, the formal outline of a biface, whether a scraper is dorsally retouched or not, whether a chopper is bifacial or unifacial, or the shape of the shoulder of a projectile point. Attributes were selected to establish cultural formal types. A type may be defined as a real form containing, in addition to other attributes of form, modification, etc., one or more attributes which show a differential distribution in space, time, and culture. They are conceived of not only as historical-index types but, since their distribution also varies culturally, as cultural types. The validity of the type is demonstrated by its distribution. This is the standard nonstatistical proof commonly utilized by most workers.

Although only one diagnostic attribute may be used for defining a type, other significant attributes usually are associated. For example, the diagnostic attributes for Pelican Lake Corner Notched points are acute or barbed shoulders and diagonal notching. Associated with this formal type, for example are certain frequencies of basal grinding, base shapes, lateral body shapes, and basal edge shapes. All of these serve to define the Pelican Lake Corner Notched type. They

are not mutually exclusive however and may be found on other point types. The occurrence frequency of these variations differs however between the two types. Other attributes may be mutually exclusive. Certain point types may include a wide range of variation, e.g., Pelican Lake Corner Notched. These variation, while they can be important (depending upon the level of analysis), fall within the range of the point type as defined in this study.

The writer conceives a "type" as a system of formal configurations which varies within certain defined limits. In the case of the Pelican Lake Corner Notched point type, it is a system of corner notched, barbed or acute shouldered points present on the Northern Plains during the time period under study, which have certain overall integrating attributes.

There is definite variation within the Pelican Lake point type in metrics and other formal attributes. These variations can characterized, if one so wishes, as subtypes, varieties, or lower order types. If one employed a taxonomic approach, one could order the variation into a systemic scheme, presenting flow charts diagramming the realtionships between the hierarchical ordering of these variations on the type as defined. In fact, preliminary studies undertaken by the writer have demonstrated that for the Pelican Lake Corner Notched type, some 48 lower order types may be derived which show definite distributions in space-time-culture.

Since I am concerned primarily with examining the relationships between the phases rather than the internal variation within the phases, I feel that the types as defined in this thesis are the most useful for the purpose.

The following typology varies in precision of definition. Many of the trial types utilized in the thesis are commonly used by many workers in the area. Other groups such as bifaces are subdivided into types simply on the basis of body outlines. End scrapers on the other hand are only very grossly types as descriptions in reports are generally so poor that fine variations cannot be discerned with any degree of confidence. The establishment of formal end scraper types would no doubt be of considerable utility to the present study.

The names chosen for the various projectile point types may not find agreement among specialists in the Northern Plains. However, whenever possible, I have used names already in the literature. I have simply more precisely defined the existing type descriptions. If regional archaeologists object to applying these names over a wide area, it should be made clear that there is no cultural significance inherent in the name itself.

The published descriptive material utilized in this study varies both qualitatively and quantitatively. Some reports are extremely good; others are bad. In most cases, projectile points are better described than other classes of tools. Even so it was sometimes difficult to decide whether or not a particular type was present. Usually photographs are adequate, permitting identification of a particular variant, but often it is impossible to give the occurrence frequency. Whenever necessary the reader may be referred to a specifically illustrated form for clarification.

In sum, the typology utilized in this study is essentially different from the kind that prevails in the published literature. The classification should aid in the ease of manipulation of data by other workers who are dealing with the same time period in the area. It should at least fulfill the purpose for which it was designed, that is, understanding the nature and dynamics of the prehistoric archaeological manifestations in the Northern Plains during the period from 1000 B.C. to A.D. 1000.

PROJECTILE POINTS

Projectile points are divided into three groups: unnotched, stemmed, and notched. These groups are also further divided into arrow or atlatl points.

Unnotched

Points which lack any points of juncture (Binford 1963) between the base and tip are classified as unnotched points (Fig. 8). Two formal

attributes are used to establish unnotched point trial types: (a) Shape of the lateral body edges--convex or straight, contracting towards the tip; (b) Shape of the base--convex, straight, or concave. Combinations of the above produce six trial types (Fig. 8).

The number of unnotched points present in any one component may be somewhat subjective as some workers have classified unnotched points as small ovate-lanceolate or triangular bifaces (knives or blanks), thereby including them with other function-specific items having similar nonmetric formal attributes.

Notched

Whether a point is notched or stemmed can be a perplexing problem. Here it is resolved by consideration of the points of juncture (Binford 1963).

Stemmed points have at least one lateral point of juncture between the base and tip; shoulders are always present (Fig. 10). Stemmed points may, in addition, have one more (distal-medial) point of juncture proximal of the shoulders, that is, a point where the curvature changes. The stem is considered to be that segment from the shoulder to the base if no intervening distal-medial point of juncture is present; or, if the latter is present, the distance from it to the base. Stemmed points will not have basal edges.

Notched points (Fig. 9) have shoulders (distal-lateral), distal-medial (distal-internal notch juncture), proximal-lateral (base-basal edge) junctures, and a distal-lateral (notch-basal edge) juncture proximal of the internal notch juncture and distal of the proximal-lateral juncture, i.e., they have a basal edge (Forbis 1962). The basal edge may be an unmodified segment of the lateral body edge such as in the typical late "side-notched" arrow point, a modified segment of the body edge such as in Besant Side Notched, or a modified segment of the stem such as in Pelican Lake Corner Notched. Regardless of the direction of notching and width of the base there are at least two points of juncture intermediate between the proximal-lateral and the

distal-medial. Within the notch there are usually at least two points of juncture--the distal-medial and proximal-medial; these are points where the internal notch curvature changes.

The typology of notched points is based on a number of attributes. For atlatl points the following are the formal attributes found to be most useful for purposes of this study.

1. Shape of the shoulder; (a) obtuse--articulation angle greater than 90°; (b) acute or right angle--articulation angle equal to or less than 90° with the distal-lateral juncture proximal of the distal-medial juncture.
2. Lateral body edge shape--convex, straight, concave, or recurved.
3. Base shape--convex, straight, or concave.

In many components arrow points are formally and metrically quite distinctive from the occasionally associated atlatl points. When the two functional types have the same formal attributes, separation of materials has been based on metrics--principally the width of the neck. Lengths and widths may overlap considerably but necks have a bimodal distribution (see Fig. 16). Presumably this reflects the different thickness of arrow and atlatl foreshafts.

Notched Atlatl

Obtuse Shouldered Types: Obtuse shouldered, side-notched atlatl points, found in the study area during the period under consideration are divided into two groups: non-Besant and Besant Side Notched.

Side-notched points found in the Eastern Archaic and Early and Middle Woodland include a number of types. While some are similar to Besant, others have very wide shallow notches and obtuse rounded shoulders, examples of which are Modoc Cave Type F (Fowler 1959:Fig. 9); McCain Site (Dragoo 1959:Fig. 31, 32); Faulkner Site (MacNeish 1948: Fig. 47 Nos. 13-16); Eastpost Site, Davis point type (Binford and

Papworth 1963:Fig. 8); Black Sand (Cole and Deul 1937:Fig. 28, 99, a17, a71, a69); Clear Lake (Fowler 1952:Pl. XLVI B-left illustrated specimen); Pool Site, Type O (McGregor 1958:Fig. 37 T-U); Irving Site (McGregor 1958:Fig. 41 f, j, k, l, m, n); Steuben Village (Morse 1963:Fig. 2) and Rice Side Notch (Wood 1967). Within the study area non-Besant forms may occur in the Pelican Lake, Hanna, and Oxbow (Long Creek) (Wettlaufer 1960: Pl. 18 3, 6) phases.

Forms which closely resemble Besant points are present in the Western Boreal Forest, e.g., Lockhart River type (MacNeish 1951:Pl. 3 5, 6, 8) which appear in Gladstone, Taye Lake Tyone, Palisades II, Tuktu, Pointed Mountain, N. T. Docks, and Lockhart River complexes. Points typed as Besant by MacNeish (1964) are found in Gladstone, Taye Lake, Ashikek, Lockhart River, Tyone River, Tuktu, and Palisades II. Obtuse shouldered points appear in the Julian, Pointed Mountain, Fish Lake, JcRw 8, MacKenzie and Spence River complexes at Fishermans Lake (Millar 1968).

In the Colorado foothills and mountains an obtuse shouldered form (Fig. 14) is common in Basketmaker II sites, e.g., Durango (Morris and Burgh 1954:Fig. 1 a, b, c, m, n; Fig. 2; Fig. 3 e-i, k-p); and in temporally equivalent sites at Hells Midden (Lister 1951:Fig. 6 left specimen); Deluge Shelter, Type 3 d and 3 e (Leach 1967:Fig. 5 d, e, f); and also in components of the Willowbrook Phase, e.g., Willowbrook Level 3 (Leach 1966:Fig. 3 j). This form is characterized by a high frequency of convex bases, convex lateral edges, generally wide shallow notches and obtuse rounded shoulders. Another obtuse shouldered variant (Fig. 14), found associated with the above is characterized by recurvate body edges, obtuse shoulder, broad shallow notches and a convex base, e.g., Deluge Shelter Type 3 c (Leach 1967), Willowbrook Level 3 (Leach 1966: Fig. 3 n, o). They also appear in various subphases of the Pelican Lake Phase, e.g., Glendo Subphase, 48PL23 (Mulloy and Steege 1967:Fig. 13 13).

Besant Side Notched (Fig. 11)

The type "Besant Side Notched" was first designated by Wettlaufer (1956:98) for characteristic point type present in the Besant levels at Mortlach, Saskatchewan.

Body: Body edges range from straight (rare) to convex (most common) with number exhibiting contracting ovate edges. The point of maximum width tends to be at the shoulder and/or base. Rarely is the maximum width located distally of the shoulder. Tips tend to be sharp or slightly blunted. Cross sections are biconvex to plano-convex.

Shoulder: Sharp (most common) to rounded obtuse. Rarely do they approach 90°. Often one shoulder will be sharp and the other rounded.

Notch: As for notch location the concept of corner versus side notch is difficult to apply to Besant points. It may be "side notched" if a segment of the lateral body edge, proximal of the notch forms a basal edge; "corner removed" if the basal edge is very small; or "corner notched" if the base width is less than body width. The blanks are, however, notched perpendicular to the body edge rather than diagonally and the point should be properly termed side notched, i.e., the blow is struck from the side. Notching is usually done from both surfaces. In some Montana collections points are alternately notched. Occasionally one notch will be unidirectional and the other bidirectional. Notch shape tends to be a broad, fairly shallow U or V shape. The medial-distal and medial-proximal points of juncture are convex or rounded obtuse. Sharp obtuse points of juncture are occasionally present. The medial notch segments are concave. Occasionally they are straight. Notches are frequently ground.

Basal Edge: The distal-lateral point of juncture varies from convex or rounded obtuse to sharp obtuse. Right angles perpendicular to the longitudinal axis are never approached. Basal edge shape may be convex (most common) or straight, which may be parallel to the longitudinal axis or contracting or expanding towards the proximal end. The proximal-lateral juncture may be convex, sharp, or rounded obtuse (most common), right angular or acute. The most common overall basal edge form is a convex-rounded shape which, depending on the height of the basal edge and base shape, may appear as either a rounded "ear" or as a "spur" (Fig. 11 20) Basal edges may also appear as straight sharp basal segments

flaring, or contracting (rarely), giving an appearance of a well defined angle with the base and notch.

Basal edge formal variation is usually bilaterally symmetrical. Bilateral variation does however exist; often one basal edge will have a sharp obtuse distal-lateral juncture, a straight basal edge, and a sharp or rounded proximal-lateral juncture, a convex or straight contracting edge, and an obtuse proximal-lateral juncture (Fig. 11 20). Basal edges are frequently ground. On many basal edges, the chipping is extremely delicate.

Base: Base thinning and grinding is very characteristic. Bases may be convex, straight (most common), or concave. The convexity or concavity rarely exceeds three millimeters. Concave bases seem to be largely a product of base thinning and grinding. Thinning techniques produce surfaces which are, when viewed in cross section, concave on the dorsal and/or ventral surface. A distinctive but rare shape is a broad, asymmetric V-shaped base. Occasionally the tang is asymmetrically located relative to the longitudinal body axis. Bases may be wider, the same as (most common), or narrower than the shoulders.

Modifications: Primary retouch usually covers both surfaces, although on some plano-convex specimens the ventral flake surface is relatively unmodified. Secondary retouch is usually confined to the lateral edges.

In general two main classes or workmanship might be distinguished: the well-finished points and the rather crude, hastily manufactured form, with retouching usually confined to the flake edges (often unifacial).

Quality of workmanship seems rather variable. In general workmanship is crude. However some specimens (particularly from the Richards Kill) exhibit a very high degree of controlled parallel flaking.

Distribution: Although the characteristic type of the Besant Phase, Besant Side Notched points are present but rare in the Pelican Lake Phase, e.g. Glendo Subphase 48PL23 (Mulloy and Steege 1967:Fig. 13 17), Mortlach Subphase (Fig. 9 17-19) Valley and Loseke Creek phases and Parker,

e.g., Uhl Zone D (Wood 1967:Type IID, 5L07 (N=2)), Magic Mountain (Irwin-Williams and Irwin 1967:Type 33 (N=12) and particularly Type 33 knife), and Willowbrook (N=1). The Willowbrook form (Leach 1965:Type IIIA) is probably a Samantha point. Some of the Uhl types, one of the 5L07, and some Magic Mountain forms subsumed in this study under Besant probably belong with the Willowbrook obtuse shouldered forms (p. 32) as their bases are quite convex. Some contain the diagnostic Besant basal edge and base attributes, e.g. Irwin and Irwin-Williams (1967:Fig. 28 bottom row center). They are also probably present in the Patten Creek and Keyhole Phases, e.g. 48PL24 Upper (Mulloy and Steege 1965:Fig. 13 8).

Metrics: Table 26 lists selected Besant Side Notched metrics.

Hanna Corner Notched (Fig. 13 13-17).

Hanna points were first defined by Wheeler (1954). Body edges are generally convex, shoulders vary from obtuse to slightly barbed, notches are broad and shallow, and bases vary from convex to concave (most common). The bases are usually bilaterally thinned and are narrower than the body. Stems are relatively long in comparison to Besant or Pelican Lake. Since the Hanna Phase is not under scrutiny in this study, the reader is referred to Wheeler for additional details.

Pelican Lake Corner Notched (Fig. 12).

The name "Pelican Lake Corner Notched" is utilized in this thesis to describe all acute or barbed shouldered, diagonally notched projectile points present in the study area during the temporal period under study. The type was first named by Wettlaufer (1956:106) for the Pelican Lake Culture at Mortlach. It has been suggested that the writer should propose some other name for this type as the name has come to be associated with a distinctive Long Creek variant. Although a new name may be desirable, the primary differences between Pelican Lake points from the Mortlach Subphase and the Pelican Lake points from the other regional phases is metrical.

Body: Lateral body edges may be convex, straight, or concave (rare). Tips are usually sharp. Very rarely the body may be skewed around the longitudinal axis resulting in an alternate bevel effect and a diamond cross section. Cross sections are biconvex to plano-convex.

Shoulder: Shoulders are barbed, acute, or right angled (rare). Barbs are generally sharp and vary considerably in length. Blunted barbs are extremely rare.

Notch: The point is a corner or diagonally-notched point. Bases are narrower than the body. Occasionally they may equal should widths. Notch depths and widths are variable. Distal-medial and proximal-medial junctures are rounded obtuse or concave. The medial segment in concave, rarely it may be straight. Notches may be ground. Alternate notching has not been observed.

Basal Edge: The distal-lateral juncture is convex or rounded obtuse. It may very rarely be sharp obtuse. The basal edge is almost always convex, occasionally it may be straight. The proximal-lateral juncture is convex or rounded obtuse. Sharp obtuse, right angle, or acute angle proximal-lateral junctures are extremely rare. The basal edge configurations vary from a rounded convex basal edge to a very sharp pointed basal edge. (Fig. 10). Bilateral variation may be present on the same point. Chipping seems to be less delicate than on Besant Side Notched.

Base: Bases vary from convex (most common) to straight or concave (rare). Basal thinning and grinding may be present (less frequent than on Besant points). The characteristic Besant basal cross sections have not been observed. The hafting segment of the point may be set asymmetric to the body.

Modification: Primary flaking is usually present over both surfaces. Unifacially flaked points are very rare. The quality of the flaking is quite variable.

Distribution: Although the characteristic type of the Pelican Lake Phase, Pelican Lake Corner Notched are also present in Besant, Avonlea, Valley, Loseke, Keith, Parker, and Willowbrook, in Parker they are represented by one specimen from Uhl Zone D (Wood 1967:Type 3E). This

seeming rarity of form may, in part, be due to problems of separating Ruby Corner Notched arrow points at LoDaisKa (most of Irwins' Type aa) from the atlatl form.

Metrics: Table 27 lists selected metrics for Pelican Lake Corner Notched points.

Snyder-Like.

Within the angular or barbed shouldered group there is a massive-looking variant. The criteria used for separating these in illustrations is the formal configuration of the body edges, shoulders, and bases. Thus Pelican Lake Corner Notched will tend to have straighter body edges, lighter barbs or acute shoulders and slightly convex to straight bases while Snyder-like points have convex body edges, acute to heavily barbed shoulders and convex bases.

In Keith, Snyder-like are present at the Woodruff Ossuary (Kivett 1953:PL. 23a--two specimens on the left), Carmondy (Kivett 1952:Pl. 26 A1), and Pottorff (Wedel 1959:Pl. 64h). In Parker three are found in Uhl Zone D (Wood 1967:Type 3B). In Willowbrook, they seem to be represented by some specimens in Magic Mountain Zone C (Irwin-Williams and Irwin 1966).

Flake Points.

The term Flake points is used to refer to edged retouched forms present in Besant and Pelican Lake assemblages.

Stemmed Atlatl

Nubbin Base (Fig. 12).

An atlatl form found in Willowbrook Phase and elsewhere to the west and southwest in Colorado is charaacterized by straight or convex body edges, generally blunted heavy barbs and a small expanding globular or nubbin stem with a convex base, e.g., Deluge Shelter (Leach 1967:Type 4e), Durango (Morris and Burgh 1954:Fig. 82 4 l, m and some of Fig. 81 l), Willowbrook Level 3 (Leach 1966:Fig. 3M), 48PL23 (Mulloy and Steege 1967:Fig. 17 3).

Other Stemmed Types (Fig. 13).

Stemmed types found associated with Pelican Lake Corner Notched in the Pelican Lake Phase may be classified as follows:

(1) Pelican Lake Corner Notched points whose stems have been broken at the neck. The broken stem has then been retouched for use. These forms are present in the Mortlach, Keaster, and Upper Miles Subphases (Fig. 13 5-8).

(2) Parallel or contracting stemmed forms, manufactured of Kootenai argillite present in the Mortlach Subphase (Fig. 13 1-4).

(3) A straight stem form in the Blue Slate Canyon Subphase.

Notched-Arrow

Avonlea Points (Fig. 13).

The Avonlea point was first described in published literature by Wettlaufer (1960:39) for the Avonlea Culture in Level 2 at Long Creek. The type name Avonlea refers to the Avonlea site excavated in 1956 by the Saskatchewan Museum of National History (Wettlaufer 1960:107). The point type had however been found at Gull Lake, Saskatchewan, in 1953 (Wettlaufer 1960:107). The Upper Kill near Coaldale, Alberta, excavated by Forbis in 1957, contained an Avonlea component. Forbis named them Upper Kill points (Forbis 1960:103). Kehoe and McCorquidale (1961) discussed the distribution of Avonlea points and sites, and described certain metric and nonmetric attributes of the points. Davis (1966) expanded both the distributional and the descriptive data for the points. Kehoe (1966) added additional descriptive and distributional data and established three varieties: GullLake "Classic," Carmichael Wide Eared, and Timber Ridge Sharp Eared.

Although Kehoe's types may have some statistically demonstrable significance in space, time, and culture, the typological basis is not statistically demonstrated. The Gull Lake "Classic" variety seems to be defined thusly: "Nearly all dimensions . . . are slightly less than the average for other Avonlea varieties." It is "slightly narrower, slightly

thinner, and lighter" (Kehoe 1966:829). On the other hand, Timber Ridge Sharp eared is "slightly larger" than Gull Lake, but thinner and with narrower ear width than Carmichael Wide Eared (Kehoe 1966:830). The nonmetric criteria for Timber Ridge seems to be "the sharpness of the bases of the ears and the lower edges of the notches," "the bases tend to be straighter, less concave and predominantly wider than the proximal end of the blade, producing a more triangular shape. The ears are also slightly wider than those on the Gull Lake variety" (Kehoe 1966:830). Carmichael Wide Eared is distinguished by "markedly inferior workmanship," shorter lengths, slightly thicker and heavier, wider and deeper notches, and rounded ears and notches (Kehoe 1966:830).

In Figure 2 Kehoe illustrates both the Timber Ridge and Gull Lake "Classic" varieties. Examination of this photograph indicates the presumed formal difference between the two forms are in the basal edge configuration, with the Gull Lake having more rounded junctures and more convex basal edge segments than the Timber Ridge. Whether this is a statistically significant variation remains to be demonstrated.

One should also add that the name "Timber Ridge Sharp Eared," although nowhere stated as such, presumably refers to the Timber Ridge Site (Davis 1966), one of the type Avonlea stations in northern Montana. Presumably, Kehoe's Timber Ridge Sharp Eared variety should be diagnostic for the Timber Ridge Site. My discussions with Davis and examination of a point sample from the site do not substantiate such an association. The reader may verify this by examining Davis's Plate II (Davis 1966).

The writer's preliminary nonmetric statistical analysis of the Avonlea points from Head-Smashed-In indicate that Avonlea points may be divided into two major types on the basis of shoulder shapes. They are: Head-Smashed-In Corner Notched, characterized by acute or barbed shoulders and Timber Ridge Side Notched, characterized by obtuse shoulders.

Analysis of the Avonlea Phase at Head-Smashed-In indicates that the two major types may be subdivided into statistically significant cultural types on the basis of lateral body edge and base and basal edge configu-

rations. The reader is referred to discussions by Davis (1966), Kehoe (1966) and Kehoe and McCorquidale (1960) for descriptions of Avonlea points. The following trial type descriptions are based on the sample from Head-Smashed-In.

Head-Smashed-In Corner Notched (Fig. 15).

At Head-Smashed-In body edges are predominantly convex (33 of 39), shoulder barbed (N=17), or acute (N=22), and bases straight (N=30), or concave (N=9). Eight specimens have serrated body edges. Basal edges are convex and usually quite small, almost pointed. Basal grinding is infrequent (N=4). Concave body edges are absent in all components assigned to this phase. Head-Smashed-In, Avonlea, Gull Lake, McKean, Medicine Creek Cave, Ludlow Cave, Lissoloe Cave, 39FA36A, 39FA35, and Trout Creek. At Head-Smashed-In they only occur in the lowermost levels. They may also appear in the Parker, Patten Creek, and Todd Phases.

Timber Ridge Side Notched (Fig. 13).

Body edges are convex (N=236) or straight (N=133). Bases are concave (N=247) or straight (N=119). Three notched bases are present in the uppermost layers at Head-Smashed-In. Basal edge configuration ranges from expanding to parallel or contracting edge segments associated with sharp or round obtuse distal-lateral junctures and sharp or rounded acute or right angle proximal-lateral junctures, to convex edge segments and junctures resulting in an eared tit appearance depending on the height of the basal edge. Basal grinding is common (65 of 122). This most characteristic point of Avonlea appears in Valley (N=1) and Parker (Irwin-Williams and Irwin 1967:Fig. 29, bottom row left).

Ruby Corner Notched.

Ruby Corner Notched exhibits the same nonmetric formal range as described for the Pelican Lake Corner Notched atlatl point. It differs significantly enough in certain metrics relating to hafting that one may consider them as arrow rather than atlatl points.

Problems may arise in separating this type from Scallorn, Head-

Smashed-In Corner Notched, and Parker Corner Notched. Certain Scallorn metrics seem different from Pelican Lake Corner Notched (longer stems, wider notches, and shorter barbs on Scallorn). Nonmetrically Ruby Corner Notched points seem easily separable from Parker Corner Notched. Separation from Head-Smashed-In Corner Notched is more difficult as both seem to exhibit similar nonmetric and metric attributes.

Ruby Corner Notched are present in Parker, e.g., Uhl Zone D (Wood 1967:Type 3E and 4 (N=5)), Keith and Todd.

Samantha Side Notched (Fig. 15).

Samantha Side Notched (Kehoe and Kehoe 1968) points seem to have the same range of nonmetric formal variation as Besant Side Notched, but metrically, it is significantly smaller. The type is distinguishable from some Timber Ridge Side Notched forms by thickness, quality of manufacture, and overall formal configuration. It is not easily distinguished from many specimens which Kehoe (1966) assigned to the Prairie Side Notched System. From his illustrated specimens, Samantha points resemble Swift Current Fishtail, Shaunavan Truncated Base, High River, Tompkins, and Lewis points. The form is also very similar to Forbis' "Irvine" type, two of which are here regarded as Samantha (Forbis 1962: Fig. 13 I and J) and also certain Nanton forms.

Aside from being the characteristic arrow point type for Besant, it is also present in Avonlea, Patten Creek (48PL24 Upper) (Mulloy and Steege 1965:Fig. 13 14) and Parker, e.g., Willowbrook (Leach 1966:Fig. 3 T).

Scallorn (Fig. 14).

The Scallorn point (Suhm and Jelks 1962:285) is defined herein as a corner or diagonally notched arrow point, having convex or straight lateral edges which are quite frequently serrated, acute or slightly barbed shoulders, broad notched, relatively long stems and predominantly straight or concave bases. Basal edges tend to be low and spurred in appearance.

A characteristic type in the Keyhole, Patten Creek, and Keith phases; Scallorn are also present in Valley and Parker, e.g., Magic

Mountain (Irwin-Williams and Irwin 1966:Fig. 29 Row 3, third from left).

Side Notched Arrow Points.

This designation refers to arrow point forms of a variety of types other than those previously discussed which appear in components and/or phases discussed in this thesis. In certain samples some may be Timber Ridge Side Notched as often illustrations and descriptions are inadequate to permit adequate distinction. They tend, however, to appear first about A.D. 700 and mainly in complexes not the concern of this thesis. Typologically we may divide them into side notched, tri-notched (with a basal notch) and double notched (two sets of lateral notches plus sometimes a basal notch). Formal configurations vary considerably. Shoulders are usually obtuse, basal edges are well defined and usually have fairly sharp points of junctures and straight basal edge segments. They appear in Besant, Loseke, Parker, Ash Hollow and Todd. For later periods they have been classified into a variety of types, e.g., Forbis (1962), Kehoe (1965).

Stemmed/Notched--Arrow.

This group includes two types: Parker Corner Notched and Columbia Valley Corner Notched which are characteristic of the Parker and Todd Phase respectively. They are characterized by very deep corner or diagonal notching which may or may not produce basal edges on a parallel or expanding stem. The bases are usually very narrow in relation to body width.

Columbia Valley Corner Notched (Fig. 14).

The type (Caldwell and Mallory 1967:49-53) is characterized by straight lateral body edges. These edges are usually serrated. The edges may also be convex or, occasionally, concave. Shoulders are heavily barbed and occasionally symmetric. Stems are straight to slightly expanding with straight to slightly convex bases. Nubbin bases are rare. Columbia Valley Corner Notched are characteristic of the Todd Phase.

Parker Corner Notched (Fig. 14).

The name Parker Corner Notched is here proposed for the characteristic point type of the Parker Phase. Lateral body edges are usually convex, although they may be straight or recurvate. Body edges are often serrated. Shoulders are usually heavily barbed and quite often bilaterally asymmetric. Stems are short, generally expanding with straight to convex bases. Nubbin bases are occasionally present. In general, the points are shorter and broader than the Columbia Valley Corner Notched.

Parker Corner Notched appear also in Keith and Patten Creek. One specimen, present in the Glendo Subphase at Uhl Zone E is thought to be intrusive (J. J. Wood, 1967). In Parker, although these points are quite distinctive, they have in some reports been lumped with Ruby notched (i.e., Magic Mountain, and LoDaisKa). Whether Parker points be termed "stemmed" or "corner notched," a bimodality in metrics relating to hafting elements is observable in the illustrated material from these sites and consequently these two types should be considered separately (cf. Irwin and Irwin 1959:Type aa, Irwin-Williams and Irwin 1966:Type 35).

BIFACES

Bifaces here are defined as bifacially flaked tools other than projectile points; most functioned primarily as perforating or cutting tools. These include such functional categories as knives, scrapers and various types of blanks. Bifaces are subdivided into two basic categories which are based on the presence or absence of modified elements which presumably served as hafts.

Bifaces with Modified Hafting Elements

Corner Notched Biface (Fig. 18).

Forms with convex or straight body edges, acute or barbed shoulders and generally convex bases. Body may be asymmetric, however the stems are set symmetric to the longitudinal body axis.

Corner Tanged Biface.

The convex body edges may be symmetric or asymmetric. The edge containing a modified haft element is manufactured by placing deep notches at one corner of the blank, thereby producing barbed shoulders

and a short stem. The stems are contained within the area of the original blank, e.g., Bentzen-Bald Mountain (Bentzen 1963:Fig. 1 37).

Duncan Biface (Fig. 18 1, 2).

Resembling a Duncan projectile point in outline (Wheeler 1953), this type is characterized by convex body edges, one or two obtuse shoulders, straight to slightly expanding stems and an indented base (c.f., 48PL23 Mulloy and Steege 1967:Fig. 13 19).

Glendo Biface (Fig. 18 5).

The short, usually broken or irregularly chipped body, has obtuse shoulders, a straight to slightly expanding stem, and a convex to straight base (c.f., 48PI24 Mulloy 1965:Fig. 13 3, 48PL23 Mulloy and Steege 1967:Fig. 13 20).

Obtuse Shouldered Biface.

Two variants are present: 1.) stem set symmetric to the longitudinal body axis (c.g., 48PL23 Mulloy and Steege 1967:Fig. 15 13-17); 2.) stem set asymmetric to the longitudinal body axis (c.f., Scalp Creek Hurt 1952:Fig. 22 14). Body edges tend to be convex and stems are relatively short.

Side Notched Biface (Fig. 18 4).

Bifaces with broad side notches set near the base. Lateral body edges are convex. Bases may be straight or convex.

Thompson Biface.

This form is characterized by convex body edges, obtuse shoulders, broad shallow side notches which may be bilaterally asymmetric in shape and a convex or straight base usually as wide as the body (c.f., Happy Hollow, Steege1967:Fig 4M).

Bifaces without Modified Hafting Elements

Classification of these forms is based on the formal configurations of the lateral edges, proximal and distal ends, and the form

symmetry.

Ovate Forms.

Symmetric Ovates--Convex Base (Fig. 19).

Characterized by convex lateral edges with the point of maximum width in the proximal half of the form. The distal ends are pointed to blunted and proximal ends are convex. The point of maximum thickness tends to be located adjacent to the proximal end. Broad in relation to its length, the lateral edges exhibit marked convexity.

Symmetric Ovate--Straight Base (Fig. 19).

Same as above except that the proximal end, which is straight or slightly convex, is obliquely set relative to the longitudinal axis.

Asymmetric Ovate--Convex Base (Fig. 19).

Same as symmetric ovate--convex base except that one lateral edge exhibits greater convexity than the other. In some specimens one edge may be straight or just slightly convex. The asymmetrical edge may be more convex towards the proximal end.

A particular variant is present in Keith Phase components. It is characterized by one slightly convex to straight lateral edge and a convex lateral edge with the maximum width located proximal of the mid-point. One specimen of each is illustrated for Carmondy (Kivett 1952: Pl. 16A 14), 14CL302, and West Island (Witty 1964:Pl. 3H).

Asymmetric Ovate--Bipoint (Fig. 19).

Same as asymmetric ovate except that both proximal and distal ends are sharply pointed.

Lanceolate Forms.

Symmetric Lanceolate.

Convex lateral edge forms with pointed distal ends and convex or straight proximal ends. Edge convexity is less than ovates and the form is narrower. The point of maximum width also tends to be more centrally

located than on ovates.

Asymmetric Lanceolates (Fig. 19).

Same as above except that one lateral edge is more convex than the other. In some specimens the other edge may be slightly convex or straight. The asymmetrical edge may be more convex towards the proximal end.

Asymmetric Lanceolate--Bipoint (fig. 19).

Same as asymmetric lanceolate except that both proximal and distal ends are sharply pointed.

Other Forms.

Circular or Semi-Circular (Fig. 20).

Discoidal forms on which a proximal end may be defined by a straight or less convex segment of the circumference.

Ovoid--Convex Base (Fig. 20).

Ellipsoid in outline; ends are not pointed.

Ovoid--Straight Base (Fig. 20).

Same as ovoid--convex base except that the proximal end is essentially straight.

Rectanguloid (Fig. 20).

Forms, rectangular to subrectangular in outline, with straight to slightly convex edges and ends. Four well defined points of junctures are present on the form. These may or may not be rounded.

Triangular--Convex Base (Fig. 20).

Isoseles or equilateral triangular forms with straight to slightly convex lateral edges, pointed distal ends and convex bases. Three points of juncture are present and the point of maximum width is at the proximal end. Form is bilaterally symmetric.

Triangular--Straight Base (Fig. 20).

Same as above except that the base is straight.

Trianguloid (Fig. 21).

Forms other than isoseles or equilateral triangles which may or may not contain right angles.

DRILLS, PERFORATORS, AND GRAVERS

Drills and perforators are primarily separated on the basis of bifacial or unifacial retouch. The classification of both is based on the modifications of the butt.

Drills

Irregular Flake Butt (Fig. 21).

While the proximal end may be unmodified, often some edge retouching is present on the butt. Dorsal and ventral surfaces remain largely unmodfied.

T-Butt (Fig. 21).

The butt of the drill is modified on the edges and usually over both surfaces in such a way as to give an overall T-shaped appearance to the drill.

Oval Butt (Fig. 21).

The butt of the drill presents a circular to oval appearance.

Ovate (Fig. 21).

No sharp point of juncture separates the butt from the shaft and the whole form presents a general ovate or lanceolate appearance.

Triangular (Fig. 21).

The lateral edges of the shaft and butt are straight. The proximal edge of the butt is straight or slightly convex.

Pentagonal Butt (Fig. 21).

The butt is pentagonal but may present an overall square or rectangular appearance depending on the relative length of the lateral butt edge in relation to the proximal butt edge.

Medial Flange (Fig. 21).

A flange is located medially along the shaft.

L-Shaped or Double Bit.

These forms have two shafts which may exhibit an L-shape or diverge from an irregular butt.

Perforators

Ovate.

Same form as ovate drills. Edge retoucheing may be bifacial though corss sections of the shaft are plano-convex.

Triangular.

Same form as triangular drills except primarily unifacially flaked. Cross sections of the shaft are plano-convex.

Irregular Flake Butt.

Same as irregular flake butt drills except that they are primarily unifacially flaked. Shaft corss sections are plano-convex.

Notched (Fig. 21).

Notches, located proximally to the mid-point, have been set in the side of the shaft to facilitate hafting.

Gravers

Tit Gravers (Fig. 21).

Either unmodified or modified projections on a flake used for engraving.

Notched Gravers (Fig. 21).

Forms having adjacent notches placed on the edge of a flake which

modify the intervening edge to a sharp point.

END SCRAPERS

Unifacially modified end scrapers have been classified in a variety of ways. Descriptions in reports are highly variable. In some reports they are simply described as plano-convex or snub-nosed end scrapers, and often the presence or absence of dorsally finished forms can only be inferred from illustrations which are often inadequate.

Attributes used in this thesis are the presence or absence of dorsal finishing; formal outline (circular-oval, rectangular to sub-rectangular, triangular, or irregular); shape of the lateral edges; and cross and longitudinal sections which relate to presence or absence of dorsal retouch and the type of flake blank utilized.

Other considerations are the overall size of the form, the neatness and placement of the retouch, and the general quality of the finished form.

Four basic flake blanks are considered: (1) irregular; (2) triangular (in both cross, and longitudinal section and outline; (3) lamellar flakes (either prismatic or truncated); and (4) other (flake or core). Although a number of derived types are possible and indeed may be necessary to the further understanding of the cultural dynamics of the period under study, no exacting typological study is undertaken herein. Besant end scraper forms are illustrated in Figure 23.

Other end scraper types include bifacial scrapers (Leach 1966) and stemmed scrapers of varying forms, which may be simple lateral indentations or true stemmed or notched forms.

UNIFACIAL AND OTHER CHIPPED TOOL SYSTEMS

Retouched Flakes

Marginally Retouched Flakes.

Flakes or core fragments which have use retouch or intentional retouch along parts of one or more edges. Certain items placed in this category probably are distinctive enough in their formal variation to

be described separately. An attempt has been made to separate some recurrent forms (see Side Scrapers).

Pointed Unifacial Flakes.

Flakes which have been unifacially or bilaterally retouched to a point.

Spokeshaves and Notched Flakes (Fig. 23).

The principal problem in dealing with the published literature is deciding whether the artifact being described is a notched scraping flake or a flake with a broad concave working edge on it which may have functioned as a cutting edge. In contrast the notched flake or spokeshave has one or more definite restricted concave working edges set into the side of the flake.

Side Scrapers

Domed Side Scraper (Fig. 23).

These forms are oval to subrectangular in form with convex cross and longitudinal sections. The dorsal surface may or may not be completely retouched.

Dorsally Finished Side Scrapers (Fig. 23).

Lanceolate to rectangular shaped forms, plano-convex in cross section with subparallel lateral edges and rounded proximal and distal ends, usually with dorsal surfaces which are completely retouched.

Pointed Unifaces (Fig. 23).

Forms characterized by ovate or lanceolate body outlines have sharp to blunted distal ends and convex proximal ends. The dorsal surface is usually completely modified. Often one edge is more steeply bevelled than the other. Specimens may have functioned as side and/or end scrapers, or possibly perforators.

Other Tools

Bifacial Choppers

Cores, cobbles, angular fragments, or large decortication flake with bifacially flaked cutting edges.

Chipped Celts.

Large bifacially modified tools, usually oval to ovate in shape, presumably functioned as celts.

Chi-Thos.

Large decortication flakes, utilized as scrapers, exhibiting the characteristic wear pattern of a chi-tho.

Cobble Choppers.

Cobbles which are unifacially flaked on one edge to form a chopping edge. The original cortex is present on the rest of the surface.

Notched Axes.

Large, bifacially-flaked core tools, with notches along the lateral edges.

Notched Pebbles.

Flat, oval to rectanguloid, bilaterally-notched pebbles, which in most contexts would be considered net or line sinkers. With few exceptions they are found in sites adjacent to rivers or streams. Since no bone is preserved in these sites fishing activities cannot positively be demonstrated and for the present their function must remain uncertain.

Pieces Esquillées.

Small pebble cores or other small core fragments which exhibit a general rectanguloid form and bipolar flaking with crushed-battered ends (MacDonald 1968). Probably present in many more components than those in which they have been identified, they are usually not recognized as tools.

Scraper Planes.

Unifacially-flaked core tools utilized as a scraper plane.

Unifacial Choppers.

Large decortication flakes or split cobbles which are unifacially chipped to form a chopping edge.

GROUND, PECKED, AND POLISHED STONE ARTIFACTS

Abraders.

Irregular shaped pieces of soft materials which have been used for abrading shafts and/or other artifacts.

Grooved and Ungrooved Mauls.

Oval to hemispherical tools with or without hafting grooves, used for pounding and crushing materials.

Hammerstones.

These are small pebbles, angular pieces, or cores, with pitted ends.

Handstones and Grinding Slabs.

Handstones are simply classified into one, two, or three facerockes. Grinding slabs are classified into unifacial and bifacial slabs.

Polishing Stones.

Pebbles showing smoothed polished areas--presumably the result of the use of the stone for rubbing hides.

Pounders.

Large cobbles or angular pieces which have been utilized for pounding and crushing materials.

Shaft Smoothers.

Regular "boat-shaped" artifacts manufactured out of a soft stone with a single groove per surface. Used for smoothing shafts.

Sinew Stone.

A soft piece of material with very small, sharp grooves running along the surface. MacNeish (1958) considers these to have been used in

working sinews.

SETTLEMENT FEATURES

Cache pits are divided into (1) straight-side, round bottom; (2) straight-side, flat bottom; (3) basin shape; (4) straight-side, stone floored; (5) bell shape; and (6) irregular. When detailed description is lacking they are simply termed cache pits. Bone uprights consist of bison bones which have been jammed tightly into an excavated hole or into the ground.

Excavated hearths are divided into basin- or bucket-shaped forms with either earth or rock fill. Other variants include stone-edged or stone-lined hearths. Surface hearths are divided into surface burns, surface burns with ash or rock fill, and surface burns with either a slab or stone edge and with or without a rock fill. Slab-floored, stone-platform hearths with or without a slab or stone edge are another variant.

CHAPTER THREE

PELICAN LAKE PHASE

The name "Pelican Lake" is proposed for this phase of the Late Middle Prehistoric Period. The name is taken from the Pelican Lake Culture defined at the Mortlach site by Wettlaufer (1958). Pelican Lake is the type name for the distinctive projectile point--"Pelican Lake Corner Notched"--found in all components assigned to this phase.

Some 90 archaeological components in the study area are assigned to the Pelican Lake Phase (Fig. 3, Table 1). Although they include a number of integrating cultural subsystems, the phase may be divided into 8 regional subphases which correspond in varying degrees to distinctive environmental areas of the Northern Plains. The subphases relate also to specific areas of archaeological activity. The similarities and differences between the various subphases are discussed in the following sections.

The name "Glendo" is proposed for the southernmost Pelican Lake regional subphase (Fig. 3). The name is taken from the Glendo Reservoir, Wyoming. Thirteen components are assignable to this subphase (Table 1, No. 1). Four are of limited use: the Limestone Butte Focus (Hughes 1949) is only briefly described; Lance Creek and Cedar Canyon are unpublished; and Happy Hollow (Steege 1967) suffers from compressed stratigraphy.

Another subphase is named after the Badger component. Four components from three sites on the Middle Missouri may relate to the Pelican Lake Phase (Fig. 3). Two of these--Badger and Tramp Deep Levels II and III--contained ceramics and could possibly represent early ceramic components. Evaluation of radiocarbon dates and other data place the Tramp Deep component in the Loseke Creek Phase and reject the ceramic association from the Badger component (p. 263). Table 1, No. 2 lists the compontents assigned to this phase.

The name "Upper Miles" is proposed for the regional Pelican Lake subphase in northeastern Wyoming and southeastern Montana (Fig. 3). The name is taken from the Upper Miles Kill, a single component site on the Powder River drainage in southeastern Montana.

The defined Upper Miles region constitutes a cluster of nine habitation components and four kills (Table 1 No. 3). The majority of

the available data is from the Keyhole reservoir area (Mulloy 1954a, Wheeler 1958). Sites assigned to Upper Miles are of varying usefulness. All four bison kills--Upper Miles, Bently, Charlotte, and State Line--are represented by collections removed by amateurs and collectors from single component kills. Of the nine habitation components, seven are excavated. Two of the latter are of very limited value--Ludlow Cave and Medicine Creek Cave--as no stratigraphic separation of these multi-component sites was affected during excavation.

Mulloy (1954a) considers the Upper Level of the McKean site to be a single component, however, it is considered by the writer and by Wheeler (1958:Part II 232-234), to be a multiple component occupation. The existence of a multicomponent occupation is demonstrable by the non-metric and metric variation in the projectile point assemblage. As Mulloy observes (1954a), a bimodal point distribution exists suggesting use of both the atlatl and the bow and arrow. The component dates around 1000 B.C. Evidence presented in this thesis indicates that the bow and arrow does not appear on the Northern Plains prior to the Avonlea Phase (ca. A.D. 200). Consequently at least two components are definable on this basis even though Mulloy could find no evidence of stratigraphic separation.

The following projectile point types are illustrated for the Upper Level of McKean (Mulloy 1954a;Fig 4): Hanna and Hanna related forms (11-21); Pelican Lake Corner Notched (1, 4, 8); Besant Side Notched (3, 12, 22?); Head-Smashed-In Corner Notched (32?, 33?, 26?, 27?); Timber Ridge Side Notched (30, 31, 34, 35, 36, 22?); Parker Corner Notched (Columbia Valley Corner Notched) (23?); Ruby Corner Notched (25, 24, 26?); and Scallorn (26?, 32?, 23?). On this basis a significant number of components is possible: Hanna or Hanna-Pelican Lake; Pelican Lake; Pelican Lake-Besant; Avonlea; Avonlea-Besant; Avonlea-Pelican Lake; Avonlea-Scallorn; and Scallorn.

Another site--48CK46, an excavated surface site--is similar to McKean in that it contained multiple components. However here the major component can be assigned to the Upper Miles Phase. Of the two surface

sites, 48CK29 is a single component, and 48CK39 is multiple component. While Riva has excellent stratigraphy its usefulness is severely limited by a very small sample.

The regional subphase of the Pelican Lake Phase in the Big Horn-Shoshone Basin is designated the Spring Creek Subphase (Fig 3) after Spring Creek Cave (Frison 1965). Of twelve components (Table 1 No. 4) Ten Sleep provides a date. Daugherty and Mummy Cave are not published and 48FR33 is culturally mixed. From specimens illustrated by Mulloy (1954:Fig. 21) for FR33, three components may be present: Hanna (Fig. 21:5-7); Spring Creek (Fig. 12:2); and Todd (Fig.12:9). The Bentzen-Bald Mountain component is slightly mixed with later materials.

The Pelican Lake regional subphase in the Upper Missouri Basin (Fig. 3) is designated the Keaster Subphase after the Keaster site. Sixteen sites (Table 1 No. 5), consisting of 4 campsites components and 12 kill sites, are assigned to the Keaster Subphase. Three campsites are of varying usefulness. BEL is a deflation site, Pictograph Cave II is arbitrarily separated from Pictograph Cave I, and Eagle Creek remains largely unpublished. The Stark Lewis site provides a representative sample from three stratified components. Of the kills, only Keaster and Billings Bison Trap have large samples. Three survey reports are also relevant (Napton 1967; Arthur 1966; and Taylor 1964). They indicate that Pelican Lake is the major occupant of the area during the time period under study.

The regional subphase of the Pelican Lake Phase in the Rocky Mountains of northern Montana and southern Alberta is designated Blue Slate Canyon (Fig. 3) after the Blue Slate Canyon Kill-Campsite (DgPl-42) in Waterton Lakes National Park, Alberta (Reeves 1967). Table 1 No. 6 lists components assigned to the subphase; of these sites only DgPl-42 and 47 have been excavated. Survey collections from Waterton indicate the Pelican Lake Phase occupation to be more intensive than either the Besant or Avonlea. Besant points are represented by four points from four sites, Avonlea by five points from five sites and Pelican Lake by more than 50 points from more than 20 sites.

The Mortlach regional Subphase is named after the Mortlach site, where Pelican Lake was first defined. This subphase which encompasses most of the Canadian Plains is more analytic than empiric as it is composed of only five excavated sites (Table I No. 7). Two are bison jumps and three habitation sites. The samples from the latter are exceedingly small, and the smaples from the jumps consist almost entirely of projectile points.

The Larter Subphase (Fig. 3), in Manitoba (Mayer-Oakes 1967) was first porposed as a focus by MacNeish (1958). Four components from two sites are assigned to this subphase (Table I No. 8). All components are considered as a unit in this thesis.

SPATIAL LOCUS (Fig. 3)

The eight regional subphases of the Pelican Lake Phase extend from the South Platte Drainage north to the Saskatchewan Drainage.

The eastern and southern boundaries of the phase are difficult to define as comparative data are not available for southern Colorado, Kansas, eastern Nebraska, and east of the Missouri River in South and North Dakota. The southwestern phase boundary will probably be found to lie somewhere adjacent to the Picosa Culture tradition of the southwest (Irwin-Williams 1967), and the eastern phase boundary may be adjacent to Early Woodland cultures in the Eastern Woodlands. Environmental areas lying outside the plains may, however, be included--the present Parkland area of southeastern Manitoba and the Rocky Mountain area from the Bow Valley in Alberta to the Big Horn Basin-Shoshone Basin in Wyoming.

The northern boundary is also difficult to define, as no excavated temporally equivalent components are known from the Saskatchewan Alberta Parklands, and adjacent Boreal Forest. The distribution of Pelican Lake Corner Notched indicates that the phase probably coincides with the present distribution of Parkland in the latter provinces. Rare Pelican Lake forms are present in the adjacent Boreal Forest (Millar 1968).

Pelican Lake Corner Notched points (Mortlach Subphase variety) are present in the Canadian Rockies north of the Crowsnest Pass and in the

adjacent Rocky Mountain Trench. Artifacts and other traits indicate that this area of the trench should be included in the phase. Further west recent excavations near the Arrow Lakes of British Columbia indicate the presence of an archaeological assemblage characterized by corner notched, stemmed and leaf-shaped points; pit houses, and a semisedentary settlement pattern based primarily on fishing (Turnbull pers. comm.). One phase of this sequence is temporally equivalent to the Mortlach Subphase. Evidence to be mentioned indicates trade and/or cultural relationships between these two phases. However, they do not belong to the same cultural tradition.

Surface collections southward in Montana indicate that the Flathead Valley should be included in the Pelican Lake Phase. South of the Flathead in Birch Creek in Idaho, temporally equivalent phases exhibit a plurality of projectile point types (Swanson et al. 1964). Consequently the Pelican Lake Phase boundary lies to the northeast of this area--most probably it coincides with the Continental Divide. To the southeast, the temporally equivalent assemblages at Deluge Shelter (Leach 1967) indicate that the Pelican Lake Phase boudary lies to the north. Most probably the boundary will lie at or near the Continental Divide, although southwestern Wyoming might be included. The Willowbrook Phase (p. 128) in the Colorado Foothills serves to define the Pelican Lake Phase boundary in this area.

TEMPORAL LOCUS (Fig. 7)

Evaluation of the radiocarbon dates indicates that complete phase transition from Hanna to Pelican Lake occurred during the period from 1300 to 750 B.C. with the Pelican Lake Phase emerging by at least 1000 B.C., when Pelican Lake points become more frequent than Hanna. Too few dates are available to indicate if this transition is temporally equivalent throughout the area, even though Hanna points are found throughout.

As may be seen from Figure 7 termination of the Pelican Lake Phase and its various subphases occurs differentially throughout the area. The termination of the phase occurs earliest in the Middle Missouri area

and at progressively later intervals westward of that area. A detailed discussion of the temporal placement of these interphase boundaries is given in Appendix II. In general, the Pelican Lake Phase terminates in the first few centuries A.D. throughout a good portion of the Northern Plains. In certain areas, particularly mountains, it persists until A.D. 500-600.

ARTIFACT SYSTEM (Tables 29, 39)

Projectile System

Unnotched

A relative high frequency of unnotched projectile points of a variety of forms occur, some of the Pelican Lake Subphases. The forms, although present in all subphases, differ sharply in their frequencies. They are very rare in Blue Slate Canyon and Mortlach; more frequent in Keaster and common in Spring Creek, Upper Miles, Glendo, Badger, and Larter.

Concave based forms are restricted to Badger and Upper Miles. Of other major variations present, the straight lateral-edge straight base form is least frequent throughout the area.

Notched-Atlatl

Pelican Lake Corner Notched (Fig. 12).

The major point type which integrates all phases or components is Pelican Lake Corner Notched point. Although the type as formally defined occurs in all components, variations between regional subphases do occur. Metrically, the Glendo Subphase points seem somewhat smaller than those of adjacent subphases, and Spring Creek may contain the next highest frequency of smaller points. The Keaster, Upper Miles, Spring Creek, and Blue Slate Canyon points tend to be larger than either the Glendo or Mortlach points. The Glendo points tend to be short and broad, whereas the Mortlach points tend to be "slim" i.e., they are similar in length to the Keaster, Blue Slate Canyon, Upper Miles, and Spring Creek, but have a narrower body. Metric variation between Upper Miles, Keaster, Spring Creek, and Blue Slate Canyon is evident in barb and stem lengths,

and notch width. Discernible clines are observable towards smaller measurements in these categories as one transects the area from the Big Horn Basin to northern Montana. Nonmetrically this is expressed in a more heavily barbed, shorter stemmed point in Spring Creek. The Larter "Larter Tanged" exhibits a metric configuration inclined towards "short fat" points.

Nonmetric variation is primarily observable in the concave base shape. They are absent in Badger and Larter; represented by single specimens in Glendo and Mortlach (at Head-Smashed-In 1 out of 30 bases); infrequent in Blue Slate Canyon (2 out of 40); and Keaster (6 out of a total of 107 from the Keaster site and Billings Bison Trap); and relatively more frequent in Spring Creek and Upper Miles (7 out of 64 at the Upper Miles Kill). The distribution suggests that it is more frequent in the southern Montana-Wyoming area than elsewhere. Another nonmetric variation is the distribution of concave lateral edges. They are present only in Spring Creek, Keaster (Carter Ferry component), and Mortlach (Long Creek component).

Hanna Corner Notched (Fig. 13 13-17).

A few Hanna points are present in the early components of the Glendo, Blue Slate Canyon, and Mortlach Subphases.

Obtuse Shouldered Forms.

Obtuse shouldered points of both the Besant and Non-Besant forms occur infrequently in the components and subphases. Most of the latter resemble the Willowbrook form (Fig. 14 1, 2, 4, 5) (Glendo, Upper Miles, Spring Creek, Keaster, and Blue Slate Canyon Subphases). Others, from the Mortlach and Larter components, very closely resemble the points found in Levels 4D and 4E at the Mortlach site, which Wettlaufer calls the Sandy Creek "Culture."

Besant Side Notched, proper, appear most frequently in the Mortlach Subphase. Three from Head-Smashed-In are illustrated in Figure 11. With the exception of these three, which date at ca. 500 B.C., all other dated Pelican Lake components containing Besant points range within 1 Sigma of the earliest Besant Phase dates (A.D. 1-100).

Flake Points.

Flake points are infrequent. They only occur in two subphases--Mortlach (Head-Smashed-In, Old Women's) and Keaster (Billings Bison Trap).

Stemmed-Atlatl (Fig. 11).

Stemmed points are very infrequent in Pelican Lake Subphases, occurring in Upper Miles, Spring Creek, Keaster, Blue Slate Canyon, and Mortlach.

Other Forms

Other forms present are Timber Ridge Side Notched in the Blue Slate Canyon Subphase (DgPl-42 Level II), Side Notched form in the Spring Creek Subphase (Spring Creek component). The first and the last instance may be intrusive from later components. The Spring Creek form is quite similar to the Spring Creek variant of Pelican Lake Corner Notched at Danger Cave.

Biface System

Bifaces with modified hafting elements appear infrequently in the Pelican Lake Subphases. Their occurrence is too low to delineate any inter-subphase variations. Duncan, Thompson, corner notched, corner tanged, obtuse shouldered and Glendo are the characteristic forms present.

Although a variety of bifaces without modified hafting elements are present in the Pelican Lake Phase, symmetric ovates with convex or straight bases are the characteristic form. In terms of inter-subphase variation, straight based ovates appear to be most frequent in Spring Creek, Keaster, Upper Miles, and Larter than in Glendo. The absence of these forms in Mortlach, Blue Slate Canyon, and Badger is probably due to the small samples.

In contrast to the symmetric forms, asymmetric ovates seem to be more frequent in the Mortlach and Blue Slate Canyon Subphases than in most of the subphases to the south, particularly Glendo, in which they are absent. Other biface forms present include asymmetric lanceolate, trianguloid, triangular, symmetric ovate-oblique base, ovoid, and rectangular. Although some of these forms are found only in the Pelican Lake Phase or in specific subphases, their frequency is too low for inter-subphase comparisons.

Drilling, Perforating, and Graving System

Since tools in these classes are infrequent, their absence in any regional subphase (ie. Mortlach, Blue Slate Canyon, Larter, and Badger) is not necessarily indicative of cultural differences.

In general the Pelican Lake Phase is characterized by irregular flake butt, T-butt, and oval butt drills. Characteristic perforator types include irregular flake butt and ovate perforators. Other perforato. types present include triangular and notched forms. Tit and notched gravers are also common.

End Scraper System

Dorsally unretouched forms are considerably more frequent than dorsally retouched forms in the Pelican Lake Phase. However, the frequencies of the two forms differ considerably between regional subphases. In Glendo, Upper Miles, Keaster, Larter, and Spring Creek, dorsally retouched forms are infrequent. In contrast, Mortlach, Blue Slate Canyon, and Badger have frequencies which approach 50 per cent of the total sample. Notched scrapers or scrapers wtih hafting constrictions occur infrequently in Glendo, Spring Creek, Upper Miles, and Larter.

Glendo forms tend to be large, with oval to subcircular outlines often associated with irregular cross and longitudinal sections. Elsewhere the forms are smaller and tend to be trianguloid or rectanguloid in outline with fewer convex lateral edges, and more regular cross and longitudinal sections. Circular or oval forms similar to some of the Glendo forms may occasionally be present in other subphases (Mortlach Subphase-Walter Felt 13 b-c (N=1)).

Unifacial and Other Chipped Stone Tool Systems

Pointed unifacial flakes are present in all subphases except Upper Miles and Badger. Their lack therein is probably attributable to classification and sampling. They appear to be least frequent in the Mortlach Phase.

Other characteristic forms are denticulates, present in Spring Creek, Upper Miles, and Glendo; pointed unifaces, present in all subphases except Badger and Larter; domed side scrapers, present in Keaster,

Spring Creek, and Glendo; and bifacial choppers, present in all subphases except Blue Slate Canyon.

Other tools present include single and double notched spokeshaves, scraper planes, pieces esquillees, and chipped celts. Heavy unifacial and bifacial core or flake tools may also be present.

Ground Stone System

Grinding slabs and handstones show a very significant subphase distribution, being very frequent in Glendo, Upper Miles, and Spring Creek, and virtually absent from Keaster, Blue Slate Canyon, Mortlach, Larter, and Badger. The implications of this distribution for subsistence activities is to be discussed shortly. Other ground stone tools which may, on occasion, be present include abrading stone and atlatl weights.

Bone Tool System

The distribution of bone tools found in Pelican Lake Subphases and components is given in Table 39. The sample is too small to allow definition of subphase variation, or of what the characteristic phase types may be.

Ceramic System

Ceramics have only been found in one clear association with a component assignable to Pelican Lake (Upper Miles Subphase, Mule Creek Rockshelter). The component is not dated.

One rimsherd and three body sherds were recovered. The sherds are grit tempered with diagonal cord-roughened exteriors (some criss-cross) and smooth wiped interiors. Decoration consists of a single row of exterior eliptical punctates producing a bossed interior. The rims are slightly constricted with a rounded lip.

The ceramics from this component are most closely comparable to Besant and Valley ceramics. West and north of the Middle Missouri River, enough sites have been excavated to indicate that in these regions the phase may be considered preceramic or aceramic.

LITHICS UTILIZED

The study of the lithics utilized in the manufacture of chipped stone tools is of considerable importance in discerning trade and other relationships between the various phases. Unfortunately no worker has yet attempted a systematic classification of the lithics utilized in the Northern Plains. Consequently much variation exists in descriptions and classifications. The following discussion in this and other chapters is restricted to materials which the writer has observed in collections in Montana, northern Wyoming, and the Canadian provinces. All classification and description is based on megascopic characteristics only.

The Keaster, Upper Miles, and Spring Creek Subphases participate in a similar lithic utilization pattern. It is characterized by the intensive and extensive use of grey and red siltstones from the Fort Union Formation, which crops out over a wide area of southern Montana and northern Wyoming. The siltstones utilized are to some degree metamorphosed, through compression, which may indicate more specific areas of quarrying. The presence of the siltstone in the northern Montana components is indicative of trade with the southern area. Obsidian, archaeologically infrequent in northern Montana Keaster Subphase components is considerably more frequent in the general area of the Yellowstone quarries.

In the Waterton Park area of the Blue Slate Canyon Subphase, some 50 per cent of all tools are manufactured from Avon chert from the central Montana Rockies. Cherts from the Northern Rockies are extremely infrequent. Kootenay argillite, quarried near the Kootenay Lake is absent. Obsidian is rare.

In the Mortlach Subphase, Knife River flint is quite frequent in Saskatchewan, decreasingly so in Alberta. The grey and red siltstones, characteristic of the Keaster and others, are represented by single specimens from Head-Smashed-In and Long Creek. Similarly, a distinctive green jasper common at the Keaster site is represented by a single specimen at Head-Smashed-In. Obsidian is very rare. Avon chert, appearing only in the lower Mortlach Subphase components, has a frequency of 5 specimens out of 180 at Head-Smashed-In.

At Head-Smashed-In and Old Women's a series of distinctive chalcedonies and cherts appear. These include a fine grained black or brown chert, and blue and grey chalcedonies, whose source area is in the Rocky Mountains. Kootenay argillite from the Kootenay Lakes in British Columbia is present. These materials are also present in Mortlach Subphase components in the Rock Mountains and adjacent Rocky Mountain Trench. Basalt is occasionally present.

SETTLEMENT SYSTEM (Table 33)

Bison kill sites, more prevalent in the northern area, are represented in Mortlach, Blue Slate Canyon, Keaster, and Upper Miles Subphases, and a single example in the Glendo Subphases (Lance Creek). They include both jumps (Head-Smashed-In, Old Women's) and pounds (Keaster, Billings Bison Trap). Post molds and logs representing the holding corrals may occasionally be preserved.

Habitation sites are located on stream terraces, or in rock shelters if they are present. On the plains, summer habitation sites may contain tipi rings (Glendo Subphase, 48PL21) and be located on the prairie level or high terrace. In the mountainous areas, summer hunting camps may be found in the alpine life zones.

Excavated basin-shaped hearths are characteristic for all regional subphases except Larter. These hearths may be rock-filled; rock-filled, stone-lined, earth-filled; earth-filled, stone-lined; or earth-filled, stone-edged. Rock-filled forms are most frequent. Excavated rock-filled, bucket-shaped hearths are present in Upper Miles and Glendo; and earth-filled, bucket-shaped hearths in Spring Creek. Amorphous roasting pits are present in the McKean component of the Upper Miles Subphase.

Surface hearth types include surface burns, rock-filled (Larter), stone platform and a stone-ringed hearth (Glendo). Of these types the stone platform seems to be most frequent.

Cache pits are generally absent, but one is recorded for Larter and one for Glendo.

SUBSISTENCE SYSTEM (Tables 40, 41)

From analysis of the tables, it is evident that some variation exists in hunting and gathering patterns between the Pelican Lake Subphases. The Glendo pattern is characterized by small ungulate and mammal hunting with a secondary reliance on bison hunting. In the Upper Miles and Spring Creek Subphases the hunting of small ungulates is comparable in significance to the hunting of bison. In the regions of the Keaster, Mortlach, Blue Slate Canyon, Larter, and Badger Subphases the hunting pattern is characterized by an almost complete reliance on the communal hunting of bison, employing traps, pounds, or jumps, depending largely on the regional physiography. In both the Spring Creek and Blue Slate Canyon Subphases there is evidence of seasonal exploitation of the montane life zones for the purpose of hunting ungulates in their summer range (bison, elk, deer, sheep). In Blue Slate Canyon, summer alpine bison hunting camps located in the cirque basins have been located.

In the Big Horn-Shoshone basin area, Frison (1965) considers the differneces in frequency of certain tools in the Late Middle Prehistoric (= Spring Creek Subphase), i.e., points, scrapers, bifaces, and grinding instruments, and roasting pits between the river sites and the montane caves to be indicative of differential seasonal resource utilization with a shift between small animal hunting and vegetable gathering in the winter in the valley bottoms and large game hunting in the mountains in the summer. However preserved faunal remains are lacking for the valley floor components.

Environmental variability is evident within the summer hunting pattern. In Mummy Cave and Birdshead Cave, sheep are dominant. In Spring Creek, Wedding of the Waters, and Bentzen-Bald Mountain, bison are dominant, followed by antelope, deer, elk, and sheep at Spring Creek, and elk and deer at Bentzen-Bald Mountain. Jackrabbits, cottontails, and birds were also hunted.

With the exception of 48FR33, which is multicomponent, the river bottom components of this subphase contain few artifacts. Projectile points are the most frequent tool type. The small sample sizes are mostly due to sampling procedures. Caves and rockshelters characteristically have a greater concentration per unit area. In the case of the sequent

Todd Phase, samples for valley sites are larger and there is an equitable altitudinal distribution of artifact types.

While the composition of the ungulate biomass will vary with the seasons and the life zones, large ungulates (bison, elk, deer, sheep) disperse in the summer in the montagne and alpine life zones. With the onset of winter they concentrate in the mountain flanks, foothills, and valley floors. If the summer alpine hunting camps confirm exploitation of this pattern in the summer, so should the winter sites, as there is no environmental reason that ungulates should be absent from the areas of the winter camps. We may conclude, therefore, that the absence of faunal remains in the winter habitation sites may be due to sampling and lack of bone preservation. This conslusion is substantiated by the faunal assemblage from 48FR97, a rockshelter on the edge of the Big Horn's flood plain in the Boyson reservoir area (Wheeler 1958:193). The single component preceramic occupation, characterized by small side notched points, is just slightly later in time than the Todd Phase. Faunal remains present include: two mature and two immature bison; one mature antelope; one mature coyote; two mature cottontail; one mature and one immature prairie dog; one mature kangaroo rat; one mature muskrat; and two mature birds. Fifty-four bones were present altogether.

Further, the cultural inventory at 48FR97 is quite comparable in frequency to Spring Creek or Todd valley sites. It includes 4 points, 6 bifaces, 1 end scraper, 3 utilized flakes and 13 bone beads. If we assume that the site from its location is a winter site, then it stands to reason that the fauna present indicates the available resources exploited by the inhabitants during the winter for the previous Todd and Spring Creek Subphases.

In conclusion, one may say that although altitudinal seasonal variation may exist in resource utilization by the Spring Creek Subphase inhabitants, it cannot yet be demonstrated on the basis of present evidence--the absence of bone in river bottom Spring Creek components may be due to preservation, not to cultural or environmental variables.

Shellfish collecting, except possibly in the Upper Miles Subphase, appears to be uncommon. Indeed, in several subphases there is no evidence of utilization of this resource. This feature may correlate in part

with the distribution of edible, freshwater shellfish in the river systems. Evidence of fowling is present in most subphases, however, the paucity of bird bones, if not due to preservation, would tend to indicate that it was of relatively little significance. Fishing activities are also indicated for some of the subphases.

The almost total lack of grinding slabs and handstones in the Pelican Lake regional subphases north of Wyoming indicates that little reliance was placed on gathering or growing plants which required grinding.

The high frequency of grinding tools in southern subphases (Glendo, Upper Miles, and Spring Creek) may correlate with a regional abundance of wild seed-bearing plants or incipient corn horticultural practices.

Many of the handstones and grinding slabs from these areas exhibit wear patterns demonstrating a back-and-forth motion which elsewhere has been taken to be indicative of corn grinding in comparison to ground stone tools used for grinding certain wild seeds which exhibit wear patterns indicative of a rotary motion (MacNeish 1967:302-303). Whether there is a one-to-one correlation between the wear patterns and the plants ground is a question which cannot be solved here. However, the environmental differences between the Colorado Foothills, where corn horticulture was practised in Early Apex times (Irwin-Williams and Irwin 1966:195), and the adjacent Plains area would not seem sufficient to preclude the possibility of incipient horticultural practices, along with wild seed grinding.

In summary, available data indicate the Pelican Lake Phase economy to be based primarily on the communal hunting of bison in the regions of the dense populations. In other regions, a more generalized hunting pattern existed, with the grinding of wild plants for food. In the southern subphases marginal corn horticulture could also have been practised. Riverine and lacustrine resources were also utilized.

There is no evidence to indicate that the Pelican Lake Phase or any regional subphase may be characterized economically as "Foragers" or any other marginal economic group. Communal hunting of bison began as early as 8500 B.C. (Reeves 1969) in the Northern Plains, and has remained the

major method of obtaining bison, throughout probably all of post-Clovis time. The number of bison kills assignable to the Pelican Lake Phase indicates highly efficient methods.

BURIAL SYSTEM (Table 38)

The only burials which may be assigned to the Pelican Lake Phase are those found in the Glendo Subphase region. The pattern (summarized in Table 38) is probably not characteristic for the phase as a whole. In general the Glendo burial pattern is characterized by single or multiple primary flexed pit interments with a few associated stone, bone, and shell grave goods.

CHAPTER FOUR

BESANT PHASE

The Besant Phase is named after the characteristic atlatl projectile point type--Besant Side Notched--first described and named as such for the Mortlach site by Wettlaufer (1955). Samantha Side Notched (Kehoe and Kehoe 1968) is the type designation for the corresponding arrow point. Unlike the Pelican Lake Phase, Besant cannot at this time be divided into regional subphases although two sequent subphases might be defined on the change in projectile point technology. Radiocarbon dates place the technological transition from atlatl to arrow between A.D. 420 and A.D. 750.

Fifty-one components from 48 sites are assignable to the Besant Phase (Table 2). Of the 15 kill sites, only Head-Smashed-In, Old Women's, Richards, 24HL101, Muhlbach, Leavitt, and Ruby are scientifically and sufficiently sampled. The others provide distributional data only. Of the 7 burial mound groups, only Baldhill, Boundary Mound I, and Alkire have been published. The 3 cave or rockshelter occupations are of use only for distributional data, as in Ludlow and Medicine Creek the Besant components are mixed with earlier and later components, and the sample from Lisoloe Cave is quite small.

The 7 unexcavated open habitation components are of limited use. Fresno and Tiber reservoir sites provide ceramic descriptions; Williston a small, slightly mixed collection; Kreiger and the Keyhole reservoir sites add to spatial distribution; and Calf Mountain, a radiocarbon determination. Of the excavated components, Avery, United Church, McKean and to some extent, Mortlach, are mixed with other components. Morris Church, 39ST9, Riva II, 48CK209, Mortlach 3, 4A and 4B and Stark Lewis 1A samples are all small. Most of the materials from the Walter Felt components were not available for study. The sample from the Porcupine component is adequate, but the samples from Kenney and Stelzer are the largest and consequently of the most use in defining the Besant artifact system. A single quarry site, Avon, provides distributional and source area data. The Burns Ranch site, currently under excavation, provides settlement pattern data. 39ST9 is tentatively assigned to Besant rather than Valley as assigned by Hoffman (1967).

SPATIAL LOCUS (Fig. 4)

Spatially Besant is confined to the Plains areas of the provinces of Alberta, Saskatchewan, and Manitoba; the states of North Dakota and adjacent northern South Dakota (as far south as the La Roche site), the western part of the Blackhills and adjacent Little Missouri-Belle-Fouche drainages, and the Musselshell-Missouri-Milk drainage areas of Montana. It may extend to the Upper Yellowstone and Powder River area. It is also present in part of the mountainous area at the Avon quarry. Avon chert is extensively used at the Kenney site.

The Besant Phase appears to be absent from the Big Horn-Shoshone and Platte basins of Wyoming, and from the Plains areas of Colorado, Nebraska, Kansas, and southern South Dakota. However, a few Besant points do appear in phases in these areas.

In Manitoba its northeastern boundary is defined by the Laurel (Anderson and Nutimik) Phase. Further west, Besant points are present in the Parkland zones of Saskatchewan and Alberta. Most probably the phase boundary is coincident with this edge. Besant points are infrequent in the northern Rocky Mountains and the adjacent Trench, and probably the phase boundary does not extend west of the plains-foothills in Alberta.

In surface collections, Besant points are considerably more frequent than Pelican Lake points in the Saskatchewan Basin and much less common in the Upper Missouri Basin.

TEMPORAL LOCUS (Fig. 7)

Phase initiation of the Besant varies from east to west in the Northern Plains. In the North Dakota-Missouri River area, radiocarbon dates place its beginning at about A.D. 1-100, at A.D. 100-200 in the Belle Fouche and northern Montana area, and at A.D. 150-250 in the Saskatchewan Basin.

Phase termination is more difficult to establish. In the Missouri River area, a cultural vacuum exists in published data between the burial mound dates and the Fort Yates Phase of the Middle Tradition (Lehmer 1966); consequently the terminal date of the Besant Phase is not known.

In northern Montana dates indicate it persisted to about A.D. 750, when it is replaced by Avonlea, which appears in that area at A.D. 400-500. In the Saskatchewan Basin it also continues until ca. A.D. 750, but there it supersedes Avonlea, which first appears in that area at A.D. 150-250; Besant is, in turn, replaced by Old Women's at about A.D. 750. In the Belle Fouche area it ends with Avonlea about A.D. 400-500. In Manitoba, the only two radiocarbon dates available for the area suggest that it may persist until ca. A.D. 900 when it is terminated by the Manitoba Phase.

ARTIFACT SYSTEM (Table 30)

Projectile System

Unnotched

Unnotched points are rare in Besant Phase components. Convex lateral edge, straight base is the characteristic type.

Notched

Besant of Samantha Side Notched are the characteristic notched point types with Samantha replacing Besant through time. The relative frequency of the two types depends on the temporal position of the component.

Pelican Lake Corner Notched forms are found in six components: Stelzer, Ruby, Mortlach 4A, Kenney Layer 8, Old Women's, and Head-Smashed-In. Of these, only Stelzer and Ruby are single component sites, without underlying components which are attributable to Pelican Lake. The high frequency exhibited at Head-Smashed-In is largely a function of stratigraphic problems at this zone in the site. Flake Points, while rare, are more common in Besant than in Pelican Lake. Side Notched Arrow Points are represented by single specimens from Porcupine Creek and Stark Lewis. Two Timber Ridge Side Notched points are present in the Kenney Layer 6 component. These two components date A.D. 405 $\pm$ 80 (GAK-1505) and A.D. 490 $\pm$ 110 (GAK-1354) respectively.

Biface System

Bifaces with modified hafting elements are quite infrequent.

However, a distinctive side notched form is present at Williston and Boundary Mound. An asymmetric corner notched form was found at 48CK209.

The characteristic biface forms are symmetric and asymmetric ovates. The latter form is quite frequent. Other types include oblique-based ovates, symmetric lanceolates, asymmetric lanceolates, asymmetric bipoint ovates, rectanguloid, straight-based ovals, and semi-circular. Straight-based ovates and triangular forms are absent.

Drilling, Perforating, and Graving System

Of a wide variety, pentagonal and triangular dirlls seem to be the characteristic forms. Others include irregular flake butt, ovate, and T-butt. The latter is represented by a single specimen from Kenney Layer 8 and may associate with an earlier component at the site.

Perforators present include ovate, triangular, and notched types. Both tit and notched gravers are present.

End Scraper System

End scrapers are characteristically small, well executed, and are made from trianguloid or rectanguloid blanks (Fig. 22). Dorsally retouched forms are frequent and characteristic for the phase. Outlines are trianguloid or rectanuloid and lateral edges tend to be straight or convex, contracting towards the proximal end. On dorsally unretouched forms, the lateral edges are often retouched.

Unifacial and Other Chipped Stone Tool Systems

Single- and double-notched spokeshaves are common. However, pointed unifacial flakes, domed side scrapers and dorsally finished side scrapers are absent. Pointed unifaces are represented by a single asymmetric specimen from Ruby, and bifacial choppers by a single specimen from Porcupine. Cobble choppers, unifacial choppers, chi-thos, and scraping planes are present only at the Kenney site. The last-named two are single specimens.

Ground Stone System

Grinding slabs and handstones are seldom found. One slab fragment

was found at Kenney and seven handstone fragments at Porcupine. Some flat stones at Stelzer may have been used as handstones. Other ground stone items include polishing stones, mauls, and abraders.

Ceramic System (Table 37)

In general, Besant ceramics are vertically or horizontally corded, bossed, or punctated concoidal vessels. One vessel from Stelzer (Type 6), characterized by horizontal cording and an exterior row of teardrop punctates with a diagonal dentate stamp band below, is similar to certain Hopewellian ceramic variations (Neuman pers. comm.). Ceramics occur rarely in Besant components outside the Middle Missouri area. Even there, their frequency is very low in comparison to Valley.

Bone Tool System (Table 39)

As with the Pelican Lake Phase bone tools are far too uncommon for meaningful comparisons.

LITHICS UTILIZED

Knife River flint and related varieties have an exceptionally high frequency in many components assigned to the Besant Phase. For example, at the Richards kill site, 113 of 117 artifacts are of Knife River flint and at Muhlbach 52 of 62 points are of Knife River flint. Knife River flint varieties are common at Kenney and 101. But it is rare at Leavitt, which is temporally late within the Besant Phase.

Another important lithic material is Avon chert. It is present at Kenney (ca. 30 per cent of the total), 24HL101 (5 points) and possibly Stelzer (1 biface). Obsidian is very rare in Besant sites--a few chips from Kenney Layer 6, 1 point at Head-Smashed-In, 2 points at Leavitt, 1 specimen each from Williston and Porcupine and 1 or 2 specimens from the Dakota mounds. The red and grey siltstones characteristic of the Keaster and other Montana-Wyoming Pelican Lake Subphases are rare in Besant components from northern Montana. At 24HL101, only 4 of 153 observed artifacts were manufactured of this material. The distinctive green jasper utilized at Keaster is absent from 24HL101.

SETTLEMENT SYSTEM (Table 34)

Kill sites include both jumps (Head-Smashed-In, Old Women's), and pounds (Myhlbach, 24HL101, Ruby). Post molds and logs, possibly the remains of holding corrals, are occasionally preserved.

Habitation sites are located on stream or river terraces. The Kenney site represents a winter habitation from approximately November to March. At the Kenney site, stones which may have been used to hold down skin tepees were found in a curved arrangement. Post molds representing habitation structures are present at Mortlach, Saskatchewan, and La Roche (39ST9). The house type at the latter is considered to be Woodland.

Other features include bone uprights (Stelzer, Porcupine, Malta, Leavitt, Muhlbach, Burns Ranch) and trash-filled pits (Kenney).

Surface hearths seem to be the characteristic type. They may be either surface burns or stone platform hearths. Excavated basin-shaped, earth-filled hearths are also present, but the rock-filled type is absent. A feature sometimes associated is a fire-broken rockpile. Cache pits are occasionally present.

SUBSISTENCE SYSTEM (Tables 40, 41)

The economy is based almost entirely on the communal hunting of bison by the use of traps, pounds, or jumps.

Collecting activities include both fowling and fishing and some shell collecting. The general lack of grinding implements indicates little reliance on seed grinding and/or grain horticulture.

BURIAL SYSTEM (Table 38)

Besant burials are known only for the Middle Missouri and adjacent North Dakota area. Here they are secondary interments in a central submound, log covered pit with a number of associated utilitarian and ornamental grave goods. Bison remains in the form of articulated or semiarticulated carcasses or skulls are often associated.

The apparent absence of burial mounds west of North Dakota, if not due to cultural factors, may be a result of the general lack of systematic survey along the major drainages or the difficulty experienced

by untrained observers in distinguishing these features from ground moraine topography.

Mound burial patterns in southern Manitoba correspond quite closely to those of the Besant. As Capes (1963:113) states, the almost universal traits are "subfloor pit interment, secondary and bundle burial, buffalo offerings, and pole covering of pits." Also, quite frequently, red ochre is sprinkled over the bodies, and boulders are placed on top of the log covering. Certain grave goods such as Olivella and Busycon shell ornaments are also common to the two areas.

It is not the writer's intent to enter the involved discussion of trait comparisons, cultural and ethnic relationships, and temporal placement of these mounds. The problem is far too complex. Because of the lack of chronological control on either mounds (MacNeish 1958:77) or habitation sites (other than the occurrence of historic trade goods in some of the mounds and the historic documentation of their use) their precise temporal ordering remains speculative.

Although no particular mound evidences any definable specific projectile point or ceramic relationships to the southern mounds, construction of the Manitoba mounds probably began at about the same time as in North Dakota and on the Missouri. The earliest mounds will probably culturally associate with the Besant Phase.

INTERNAL SPACE-TIME-CULTURAL DIFFERENCES

Temporally, differences are observable in the projectile points. The three Besant Side Notched points from the Pelican Lake Phase components at Head-Smashed-In have wider notches, longer stems and broader necks than is usual. They probably predate Besant Phase occupation of southwestern Alberta by 500 years. Internal cultural change is observable in the increasing frequency of Samantha Side Notched through time in certain Besant Phase components in the northern Montana and Saskatchewan basin areas. This transition is placed from ca. A.D. 450 to ca. A.D. 750 and presumably represents the gradual but final complete acceptance of the bow and arrow.

Whether other form-function artifact systems changed during this

period cannot yet be demonstrated. The biface system probably changed gradually from asymmetric ovate to asymmetric lanceolates, which are characteristic for the coeval Avonlea Phase. The above change is suggested by Stark Lewis 1A, which contained asymmetric lanceolate forms and obsidian dates at ca. A.D. 600.

Some spatial differences among components may be suggested by the exclusive presence of rectanguloid, ovals with straight base and semicircular bifaces at the Kenney site; and other tool types, such as T-butt drills, cobble choppers, unifacial choppers, chi-thos, and a scraping plane are present only at the Kenney site. Pentagonal butt drills are present only at Stelzer. Whether or not the above instances represent cultural differences or sampling problems cannot be resolved at this time.

The differential spatial distribution of ceramics presents a similar problem. Ceramics are very rare in Besant components (e.g., Stelzer 16 rims, 75 body sherds; Porcupine 11 rim sherds, 54 body sherds). They are absent at Kenney, Mortlach, and Long Creek. Their high frequency at United Church may be skewed as this site probably contained multiple Besant components which were not separable during excavation. The low frequency or absence of these ceramics may indicate that ceramic technology was not particularly functional in this culture where the economy was based on communal bison hunting. Although there is no direct evidence, it is probably thathide containers largely filled the functional roles of pottery vessels in this culture.

What is the role of ceramic containers in nonhorticultural bison-hunting nomadic cultures of the Northern Plains? Some workers (Mayer-Oakes 1967; MacNeish 1958) consider the presence of adhering carbonaceous material on the inside of the pot to be indicative of boiling, and its absence probably indicative of the pot being used only for water or food storage. But why would ceramics be manufactured solely for the purpose of storage or water carrying when such purposes can be better served by skin containers which are much more easily manufactured? In a nomadic culture, with an abundance of bison hide and innards for containers, why

transport fragile pots solely for this purpose? Surely, for nomadic hunters, the functional advantage of ceramics over hide containers or other methods is in the cooking of certain foods in certain ways. This advantage must have outweighed the disadvantages of transport, and of the extra energy required in the manufacture of small numbers of vessels.

Ceramics are moderately abundant in Valley, Loseke, and Keith. Their increased frequency might be construed as the function of realtively larger and more sedentary populations in these spatially adjacent phases. The faunal remains do not, however, indicate any large populations, it is probable that some other more stable localized food source was utilized. Since corn horticulture clearly is present in the Willowbrook and Parker phases in Colorado, it may have been present in Valley and Keith, which are characterized by quantities of ceramics and fairly permanent villages.

Consequently I suggest that partial correlation exists between the frequency of ceramics, the degree of sedentarism, and corn horticulture in the Northern Plains--both during the period under study and for later Northern Plains cultures outside the Middle Missouri area.

The differential distribution of ceramics in Besant may or may not be culturally significant. Certainly, ceramics seem more frequent in the Middle Missouri-Manitoba area than in the western part of the area. But whether the eastern groups are more sedentary, more open to outside influences, or practised some horticulture, cannot, at this time, be determined. The other Besant cultural system which may vary significantly is the mound burial system, if it is indeed absent outside the Dakota-Middle Missouri area. While perhaps desirable, subphase division into eastern and western Besant on the basis of the above traits is not proposed at this time.

CHAPTER FIVE

AVONLEA PHASE

Thirty-six components are assigned to the Avonlea Phase (Table 4). Of the 21 kill components belonging to the phase, only the Head-Smashed-In and the Upper Kill have been studied in any detail by the writer. Collections from the 12 excavated campsites are relatively small. Ludlow Cave and Medicine Creek Cave are stratigraphically mixed and provide distributional data only. Head-Smashed-In (DkPj-2), Trout Creek, and Mud Creek provide ceramic data. The Garratt site in Saskatchewan contains large quantities of ceramics but is not yet published.

Descriptions of the Avonlea cultural systems are limited because of the general lack of excavated campsite components. Duguid (1968) assigns a kill-campsite on the North Platte in Wyoming to Avonlea but the points are not Avonlea. They most closely resemble points assigned by J. J. Wood (1967) to the Late Ceramic Period in northeastern Colorado.

SPATIAL LOCUS (Fig. 5)

The Avonlea Phase is present in the Saskatchewan Basin in Canada, in the Plains Parkland of Alberta and Saskatchewan, and possibly in the Plains area of southwestern Manitoba (Avery site). In the Missouri Basin, the phase is present on the Upper Missouri in northern Montana and in the Upper Yellowstone drainage. It is also present on the Little Missouri, Belle-Fourche, and Niobrara Rivers in the area where Montana, South Dakota, and Wyoming merge. Whether site distribution within the area as seen in Figure 3 is a function of sampling or cultural variables cannot be determined at the present time.

Avonlea points also appear in the Parker, Patten Creek, Valley, Todd, Besant, and the Blue Slate Canyon Subphases; also in the Nutimik Phase (Lockport component) and in the Rocky Mountain Trench. In all cases, occurrence frequency is very low. By and large Avonlea is confined to the Plains west of the Middle Missouri area, north of the Platte drainage, north of the Big Horn-Shoshone Basin, east of the main Rocky Mountains, south of the Boreal Forest in Alberta-Saskatchewan, and the Parkland in Manitoba.

TEMPORAL LOCUS (Fig. 7)

The transition from Pelican Lake (Mortlach Subphase) to Avonlea is placed at A.D. 150-250 in Alberta-Saskatchewan. Avonlea is replaced by Besant at A.D. 700. In northern Montana, phase initiation is placed at A.D. 400-500 and termination at A.D. 900; in southern Montana, it begins about A.D. 500-600 and ends about A.D. 900. In the Belle-Fourche-Powder River, the phase falls within a brief period from A.D. 400-500. In the Black Hills, its temporal interval is unknown. The Upper Kill, on a typological basis, probably is the most recent Avonlea site.

ARTIFACT SYSTEM (Tables 30, 37, 39)

Projectile System

Unnotched

Unnotched points are infrequent in Avonlea components. At Head-Smashed-In only 12 of 445 specimens were unnotched. Straight-based forms seem to predominate.

Notched-Atlatl

Pelican Lake Corner Notched is represented by 3 specimens from the lowermost components at Head-Smashed-In and 1 specimen from Lissolo Cave. Besant Side Notched is represented by 5 specimens from the early components at Head-Smashed-In. These points are *in situ*.

Notched-Arrow

Head-Smashed-In Corner Notched and Timber Ridge Side Notched are the characteristic Avonlea types. From Table 34, it may be seen that the two types are not associated in all components. Since Head-Smashed-In Corner Notched is quite frequent in the early Avonlea components at Head-Smashed-In, the two probably only occur together in early components of the Avonlea Phase.

Flake points are quite infrequent in Avonlea, being represented by 16 specimens at Head-Smashed-In. Four Samantha Side Notched points were found associated in the latest components at Head-Smashed-In. Six side

notched forms also were associated in these levels, however these may be intrusive from the overlying Old Women's component as the stratigraphy is quite complex at this level. At the Upper Kill four side notched specimens are definitely associated.

Stemmed-Arrow

Three specimens at Head-Smashed-In are from the lowest levels. One complete specimen is characterized by serrated convex lateral edges, heavy barbs, and a short stem (Fig. 13).

Biface System

Bifaces are absent from the lower levels at Head-Smashed-In. However, bifacial resharpening flakes from these levels indicate their use at the site. Bifaces with modified hafting elements are represented by a notched ovate form from Timber Ridge.

Asymmetric bifaces are characteristic for Avonlea. In time they trend from ovate to lanceolate in form. There is also a reduction in size. A diamond-shaped form is present only in this phase. Other forms include symmetric ovate with convex or straight base, most frequent in the earlier componetns, asymmetric bipoint ovate, asymmetric circular, asymmetric and symmetric rectanguloid, and symmetric lanceolate.

Drilling, Perforating, and Graving System

Represented are a double-bit drill and two irregular flake butt perforators.

End Scraper System

Both dorsally finished and unfinished forms are present. Flake blanks tend to be triangular or rectangular. Cross sections are convex, angular, or flat. The forms are small and well made.

Unifacial and Other Chipped Stone Systems

Pointed unifacial flakes, bifacial, and cobble choppers are present.

Ground Stone System

A unifacial grinding slab was found at 39FA36A. A scratched stone was found at the Upper Kill.

Ceramic System (Table 37)

Avonlea ceramics, infrequent in occurrence, are fabric-impressed, bossed, or punctated conoidal vessels. However at the Upper Kill, obliterated cord-marked body sherds were found in association. One, a shoulder sherd, has a band of diagonal stick impressions at the shoulder.

LITHICS UTILIZED

Davis (1966) has previously discussed some of the distinctive Avonlea lithic types. Until detailed physical-chemical studies are undertaken of lithic types, meaningful comparisons must be restricted to macroscopic physical characteristics. The types Davis discussed seem to be present at Head-Smashed-In although their occurrence frequency seems to be quite different from Timber Ridge. This may, however, relate to temporal factors. The grey siliceous siltstone (probably welded tuff) and black siliceous sitlstone (both Tertiary basalt and Nordegg Formation sedimenatary materials) occur in both sites although the latter is considerably more frequent at Head-Smashed-In, particularly in the early components.

Avon chert represents some 2 points out of 126 points from the lower levels at Head-Smashed-In. A white-to-pink chert may constitute up to 50 per cent of the total sample. Other cherts include a Permo-Pennsylvanian black chert, a brown chert like some Besant varieties, and various jaspers. Chalcedonies include a translucent yellow-brown variety, a grey-blue chalcedony, and a dark blue chalcedony with black inclusions which is almost totally restricted to the lower components. Quartzite is rare (less than 1 per cent), and red and grey siltstones are absent both at Head-Smashed-In and Timber Ridge. Recognizable Knife River Flint is absent, and obsidian is very rare. Upper Kill lithics are similar to Head-Smashed-In.

The Tertiary basalt and some of the chalcedonies and siltstones point to a mountain-foothills source area.

SETTLEMENT SYSTEM (Table 35)

Both jumps, pounds and traps, are used as bison kills. Habitation sites are located on stream terraces and in caves. Settlement features are generally unknown. At 39FA36A, 8 excavated basin- and bucket-shaped, rock-filled hearths (1 of which was stone lined) and a basin-shaped earth-filled hearth were present.

SUBSISTENCE SYSTEM (Tables 40, 41)

The large number of Avonlea kill sites indicate bison to be a major food resource with small ungulates forming only a minimal part of the diet. Collecting activities include fowling, fishing, and plant gathering.

BURIAL SYSTEM (Table 38)

The Avonlea burial pattern may be characterized by a primary flexed or extended pit burial with considerable quatities of utilitarian and ornamental grave goods. This pattern is known only from northeastern Wyoming.

CHAPTER SIX

VALLEY AND LOSEKE CREEK PHASES

The Valley and Loseke Creek Phases (foci) were first defined by Hill and Kivett (1941) and Kivett (1953) respectively. For the purposes of this thesis, these two phases are considered as sequential phases of the same cultural tradition.

Valley Phase sites are characterized by the presence of Valley Cord Roughened (Hill and Kevett 1941, Kivett 1949b). In Valley, vessels are conoidal with poorly defined shoulders and unconstricted necks. Bosses and punctates are the major decorative techniques. Important decorative techniques on Loseke Creek ceramics are cork-impressed designs on the lip and rim. Loseke vessels, both the cord-impressed and bossed-punctated types, have restricted necks, better defined shoulders, and conoidal to globular bodies. The cord-impressed and related ceramic types may or may not be dominant over punctated-bossed (Scalp Creek) ceramics in Loseke Creek sites.

SECTION 1: VALLEY PHASE

Eighteen components are assigned to the Valley Phase (Table 4). Vy-1 is the only site which has been extensively excavated. Many of the components represent small collections of sherds from the surface or a trowelled face (25CE4, 25HT4, 25HT20, and Dads Lake). Phase assignment for these sites is usually based on ceramic descriptions. Other sites such as Naper, 25KX7, 25DO2, and Christianson are also tentatively assigned to Valley.

The assignment of burials to either of these phases is based on site association, and projectile point association or radiocarbon dating. In many cases these may not necessarily equate with the phase (e.g. burial near Vy-1 on hillside and Christianson with Valley; Sherman Park, Old Quarry, Truman, Sidehill, White Swan, Wheeler Bridge, Scalp Mound, Arp Mound, Scalp Village, and Wolf Creek with the Loseke Creek Phase).

SPATIAL LOCUS (Fig. 6)

The Valley Phase seems on the basis of present data to be restricted to the northeastern quarter of Nebraska from the Platte River, north and

eastward from approximately 101° west longitude to the Missouri River. The southern and western phase boundaries seem to be well defined by the presence of the Keith Phase in the adjacent Republican River drainage and by the absence of Valley ceramics in the western half of Nebraska. The eastern phase boundary may be placed at the Missouri River but Valley, or a closely related phase, is probably present in western Iowa.

Present data would seem to indicate the northern boundary to be more or less coincident to the South Dakota-Nebraska border, as sites such as Arp are primarily assignable to the Loseke Creek Phase. Spatial delimitation of this boundary between Valley and Besant phases should eventually be possible.

TEMPORAL LOCUS (Fig. 7)

Phase transition from Pelican Lake to Valley is placed at A.D. 1-100 and phase transition from Valley to Loseke at A.D. 500-600.

ARTIFACT SYSTEM (Tables 31, 37, 39)

Projectile System

Unnotched

Unnotched forms, rare in the Valley Phase, are usually convex edged with straight or convex bases.

Notched-Atlatl

Pelican Lake Corner Notched seems more frequent than Besant Side Notched.

Notched-Arrow

Scallorn is represented by 2 specimens, Samantha by 1, and Timber Ridge by 1.

Biface System

Rectanguloid, symmetric ovate convex base, and asymmetric ovate forms are present.

Drilling, Perforating, and Graving System

Irregular flake and T-butt drills are present.

End Scraper System

Body outlines are ovoid to elliptical; cross sections are flat, angular, or convex. Although none is specifically described as being dorsally finished, some of Hill's and Kivett's Type 1 may be so modified. The characteristic trianguloid and rectangloid forms associated with Besant are, however, absent.

Unifacial and Other Chipped Stone Tool Systems

Pointed unifaces, sidescrapers, spokeshaves, and choppers are not described for Vy-1.

Ground Stone System

Handstones and grinding slabs are absent. Other tools present are an atlatl weight, a polished celt, and abraders.

Bone Tool System (Table 39)

Of the bone tools present, perforated bison phalanges and serrated fleshers may be of some comparative value.

Ceramic System (Table 37)

In general, the ceramics are vertically-corded, conoidal pots with bossed, punctated, or cord-wrapped stick designs on the rim, and cord-wrapped stick designs on the lip. Dentate stamp ceramics occur in two components--Leahy and 25DK4. The former may be classified as Hopewell Ware "Hopewell Rim" (Griffin 1952:116) and the latter as a Hopewell or Naples Stamped variant.

SETTLEMENT SYSTEM (Table 35)

Habitation sites are located on creek or river terraces. At the Vy-1 site, 10 oval to circular excavated basins--7 of which were trash-filled--were excavated. Most contained an unprepared central hearth characterized by white ash. Storage pits at Vy-1 are basin, irregular, and bell-shaped. Surface hearths exposed at other components are ash-

filled. Excavated hearths are absent.

SUBSISTENCE SYSTEM (Tables 40, 41)

The Valley hunting pattern is characterized by the hunting of small ungulates rather than a primary emphasis on bison. Shellfish collecting is quite important. Fowling and plant gathering were also practised. Corn horticultural activities may be inferred from the abudance of ceramics and permanent habitations, suggesting that the populations were semisedentary hunter-gatherer-horticulturalists.

BURIAL SYSTEM (Table 38)

Two patterns are evident, secondary burial in a pit with no overlying mound, or secondary burial in a pit basin or on the mound floor below a mound. The few grave goods present seem to be all of a utilitarian nature.

SECTION 2: LOSEKE CREEK PHASE

Eleven components are assigned to the Loseke Creek Phase (Table 5). Scalp-Ellis, Arp, Tramp Deep, Loseke, Eagle Creek, DX2, and DX5 are habitation or burial mound components. A more representative sample is available for phase definition than for the preceding Valley Phase. For convenience the Scalp and Ellis sites are referred to as Scalp.

SPATIAL LOCUS (Fig. 6)

Available data indicate a spatial distribution for Loseke similar to that of the preceding Valley Phase in the northeastern portion of Nebraska and adjacent South Dakota. Loseke, however, seems to be slightly more restricted in that it is seemingly absent west of the Loseke Creek area on the Platte and Loup drainage. Ceramics similar to Loseke Cord Impressed are among the types present at the Thomas site in western Iowa (Brown 1967) and are similar to Keyes (1949) Missouri Bluffs Cord Impressed ceramics in western Iowa.

TEMPORAL LOCUS (Fig. 7)

Phase transition from Valley to Loseke is placed at A.D. 500-600.

Phase termination for Loseke is placed at A.D. 900-1000 by the Over Phase (focus) materials (p. 283).

ARTIFACT SYSTEM (Tables 31, 37, 39)

Projectile System

Unnotched

Unnotched forms are infrequent, and characteristically convex-sided with straight or convex bases.

Notched-Atlatl

Like the preceding Valley Phase, Pelican Lake Corner Notched is more frequent than Besant Side Notched. An atlatl form found at Tramp Deep had double side notches and a basal notch.

Notched-Arrow

Side Notched arrow points are present in the later components.

Biface System

Bifaces with modified hafting elements consist of obtuse shouldered forms with symmetrically or asymmetrically set stems.

A variety of biface forms characterize Loseke. The most frequent forms are asymmetric variations such as lanceolate, ovate, and bipoint ovate. Symmetric forms present are ovate, lanceolate, triangular, trianguloid, rectanguloid, circular, and oval-straight base.

Drilling, Perforating, and Graving Systems

Pentagonal butt and triangular drills are characteristic. Also present are ovate and irregular flake perforators and tit gravers.

End Scraper System

Dorsally retouched forms are relatively abundant. Some trianguloid-rectanguloid forms are very similar to the Besant. Oval to ovate forms characterized by convex lateral edges are present at Scalp. Dorsally unretouched forms have the same formal outlines as the ovate-

oval forms. Some of the Scalp forms are large, core type scrapers. One stemmed scraper was present at Scalp.

Unifacial and Other Chipped Stone Tool Systems

Forms present include pointed unifaces, domed side scrapers, dorsally finished side scrapers, bifacial choppers, and cobble choppers. Pointed unifacial flakes are not described.

Ground Stone System

Grinding slabs and handstones are present. Other forms include grooved mauls, abraders, shaft-smoothers, polished celts, and an atlatl weight.

Bone Tool System (Table 39)

Of note are scapula hoes and unserrated fleshers.

Ceramic System (Table 37)

Loseke ceramics have been classified by both Hurt (1952) and Kivett (1953). In general Loseke vessels are subconoidal to globular, usually vertically corded vessels, with punctate, bossed, cord impressed or incised designs on the lip and/or rim. Regional variance is evident in the occurrence of the two decorative techniques. In the northern components such as Arp, punctate-bossed designs have a high frequency (N=32) and cord-impressed designs have a low frequency (N=3), whereas to the south in Loseke Creek, punctate designs have a very low frequency, and cord-impressed very high (N=100).

SETTLEMENT SYSTEM (Table 35)

Sites are located along streams or rivers. Remains of habitation structures were found at Scalp and Loseke. Cache pit forms include: (1) straight-sided round bottom; (2) straight-sided flat bottom; (3) basin-shape; and (4) bell-shape. Excavated basin-shaped hearths are frequent; surface hearths with or without ash fill are also common.

SUBSISTENCE SYSTEM (Tables 40, 41)

Hunting patterns vary through space. In the north, bison were

characteristic; whereas in the south, deer were the primary ungulates hunted. Shellfish formed a significant part of the diet. Fowl, fish, and plants supplemented the diet. Corn horticulture, as evidenced by cobs and kernels, was definitely practised, probably to a significant extent. In general we may view the populations as semisedentary, hunter-gatherer-horticulturalists, with perhaps a greater dependence on horticulture than in the preceding Valley Phase.

BURIAL SYSTEM (Table 38)

In general the burial system is a primary or secondary interment pattern in submound pits or basins. Considerable quantities of utilitarian and ornamental grave goods are associated.

CHAPTER SEVEN

KEITH PHASE

The Keith Phase (foci) was first defined by Kivett (1953). A site is usually assigned to the Keith Phase only if it contains "Harlan Cord Roughened" ceramics whose sole exclusive attribute is calcite temper. In this thesis certain other sites without calcite tempered pottery (e.g., Massacre Canyon) have been assigned to the Keith Phase on the basis of other assemblage elements.

Eighteen components (Table 6) are assigned to the Keith Phase. Six are ossuary components: Woodruff, Guide Rock, Orlean, Holdridge, Flag Creek, and Robb. Only Woodruff is described in any detail. Habitation components vary in their usefulness for phase definition. The Medicine Creek Reservoir sites have yet to be fully published; Massacre, Carmondy, West Island, and Pottorff provide small, fairly representative samples; Coal Oil Canyon and 14CL302 are stratigraphically mixed; Walter, 14RU302, 14RU303, and Ough provide ceramic data; and 25RW28 a carbon date.

SPATIAL LOCUS (Fig. 6)

The Keith Phase is present in northwestern Kansas from the Salinas River Valley north to the Republican River Valley in southern Nebraska. The southern phase boundary is not well defined but it probably lies largely north of the Purgatory River. The eastern phase boundary is perhaps more or less coincident with the present site distribution and probably should be bounded by sites, both habitation and burial, which Eyman (1966) assigns to the Schultz Focus, which lies in the eastern part of Kansas west of Kansas City Hopewell. The northern phase boundary is defined by the Valley-Loseke Phase distribution, which probably includes the Platte River drainage in eastern Nebraska. The western phase boundary probably approximates the Colorado Kansas-Nebraska state line, with Parker Phase sites located to the west in northeastern Colorado.

TEMPORAL LOCUS (Fig. 7)

The transition from Pelican Lake to Keith is placed at A.D. 200-300; Keith is replaced by Upper Republican at A.D. 900-1000.

ARTIFACT SYSTEM (Tables 31, 37, 39)

Projectile System

Unnotched

Unnotched points are frequent. The characteristic forms are convex-based with straight or convex lateral edges.

Notched-Atlatl

Pelican Lake Corner Notched and Snyder-like forms are fairly frequent. Kivett (1949a:Fig. 69c) illustrates an obtuse shouldered form from Medicine Creek. Whether it is a Besant Side Notched or Rice Side Notched (W. R. Wood 1967) type cannot be determined from the photo. A similar looking specimen is illustrated by Witty (1962:Pl. IV 2K) for 14CL302.

Notched-Arrow

Scallorn points are the characteristic type. In most components Parker Corner Notched and Ruby Corner Notched will be found associated with them.

Biface System

Bifaces in Keith with modified hafting elements are absent. Biface forms may be characterized as symmetric or asymmetric ovate; the former is more frequent. Other forms present include ovals, trianguloids, and subcirculars.

Drilling, Perforating, and Graving System

T-butt drills are probably the common type. Other forms are medial flange and irregular flake butt drills.

End Scraper System

Dorsally finished forms seem characteristic for the Keith Phase, although for many components the frequency is not given, the descriptions are inadequate, and the illustrations poor. Outlines vary from trianguloid to rectanguloid. Lateral edges may be convex or straight (concave

on one specimen from Carmondy). Some illustrated specimens seem identical to the small, well-made Besant forms.

Dorsally unretouched forms are also present in the Keith Phase. Flake blanks may be irregular, oval, rectangular, or triangular. Cross sections are flat or angular. The lateral edges may be convex or straight. Notched end scrapers, very similar to Hopewellian forms at Renner (Wedel 1943), are present at Massacre Canyon.

Unifacial and Other Chipped Stone Tool Systems

Pointed unifacial flakes, pointed unifaces, single- or double- notched flakes and side scrapers are absent. Bifacial choppers and chipped celts are present. A marginally retouched bipointed tool was found at Massacre Canyon (Kivett 1952:Pl. 9A 21).

Ground Stone System

Grinding slabs have not been described even though handstones have been recovered. Other items include irregularly shaped shaft smoothers.

Bone Tool System (Table 39)

Ceramic System (Table 37)

The ceramic attributes of Harlan Cord Roughened (Kivett 1953) and other noncalcite-tempered ceramics found in components assigned to Keith may be summarized as vertically corded, undecorated conoidal vessels.

Calcite-tempered sherds are exclusive to Woodruff, Guide Rock, Flag Creek, Carmondy, Medicine Creek, Scott Island, and CL302. They occur with grit-tempered sherds and sand-tempered sherds in Walter, with grit-tempered sherds in Pottorff, Red Rock Canyon, and Holdridge 5, with sand-tempered sherds in Coal Oil Canyon and Elm Creek. Sand-tempered sherds are exclusive in Ough, Massacre Canyon, and RU302, and grit in RU303. A vessel from Richardson County is classified by Kivett (1953:133) as Harlan Cord Roughened, but described by Hill and Kivett (1940:223-224) as having sand temper. Farther south, in the Toronto reservoir, calcite-tempered sherds are also present at 14GR216, 217, and 205 (Johnson 1957). North at the Whalen site clacite-tempered sherds are associated with Valley

Phase ceramics.

Comparing calcite-tempered vessels with the others, one finds the same variations in surface finish, vessel form, and genreal lack of decoration. Exceptions are the turkey track design (two examples from two sites), the punctate (one example from one site) on calcite-tempered ceramics, and the decorative techniques on the two sand-tempered Massacre Canyon varieties (trailed line and diagonal impressions on lip). The only essential difference appears to be in temper type. In one instance, at Walter, calcite and sand occurred together in the same sherds. Geographically, Harlan Cord Roughened, as an exclusive occurring temper type, seems restricted to the Upper Republican drainage (although Massacre Canyon and Ough have other temper types). Sites containing sherds with other temper types with or without associated calcite-tempered ceramics, occur south of this area. Consequently Harlan Cord Roughened should not, I feel, be used as the sole diagnostic as to whether or not a component is assigned to Keith.

Dentate stamp ceramics, possibly of Hopewellian origin, are represented by a zoned rocker-roughened sherd from Pottorf.

SETTLEMENT SYSTEM (Table 35)

Habitation sites are located on stream terraces. Oval habitation basins are present at Medicine Creek and Massacre Canyon. At Medicine Creek the basins are described as circular to oval, with poorly defined central hearths and associated post holes. Cache pits are straight-sided with flat bottoms.

Surface burns and excavated basin-shaped earth-filled are the characteristic hearth types. Other variants include a slab-edged, stone-platform hearth, and an excavated bucket-shaped earth-filled hearth.

SUBSISTENCE SYSTEM (Tables 40, 41)

Hunters relied on small ungulates with only marginal use of bison. Shellfish collecting formed a significant part of the diet; fowling was of some importance. Corn horticulture was probably practised and formed

a signigicant part of the diet. Keith Phase populations may be characterized as semisedentary, hunter-gatherer-horticulturalists.

BURIAL SYSTEM (Table 38)

Burials may be located either in habitation sites or in ossuaries. They may be single or multiple, primary or secondary pit burials, or multiple, secondary, disarticulated burials in an ossuary basin which has been superimposed on earlier pits. Associated grave goods are both of utilitarian and ornamental nature.

CHAPTER EIGHT

PARKER AND ASH HOLLOW PHASES AND THE PURGATORY RIVER SHELTER

The Parker and Ash Hollow are conceptualized as partially sequent phases of the same cultural tradition. The Purgatory Shelter is included as it is a time-equivalent woodland component from southern Colorado.

SECTION 1: PARKER PHASE

Phase nomination follows that proposed by J. J. Wood (1967) with the substitution of the term phase for focus. Original foci designation was by Withers (1954).

J. J. Wood (1967:605) proposes that the following components be assigned to the Parker Phase in the Denver Basin; LoDaisKa Zone B, Magic Mountain Zone A, Willowbrook I-Level 4, Hall-Woodland Cave and the Kassler Quadrangle sites. Although he does not specifically assign the Uhl Zone D and other similar ceramic sites in his study area to the phase, he notes that their closes relationships are to the Parker Phase, (with the exception of Hatch B which is assigned to Ash Hollow Phase). For purposes of this study, these components and Michaund A are assigned to the Parker Phase. An additional site assigned to this phase is Happy Hollow. Magic Mountain Zone B is separated into two components; one consisting of artifacts which I feel associate with the Parker Phase of Zone A, and the other of artifacts which I feel associate with the Willowbrook Phase of Zone C at Magic Mountain.

Of the 20 sites assigned to the Parker Phase, a number are of limited use. The Kassler Quadrangle sites are unpublished. Michaund A, not yet published, is included both for chronological control and data on the burial system. Happy Hollow suffers from compressed stratigraphy and consequently is of limited value. The group of sites discussed by Wood (1967) for the northeastern Colorado area seems to exhibit a great deal of cultural homegenity and consequently since Uhl has the largest sample, it only is utilized in this thesis.

A Woodland Phase equivalent to the Parker is the Graneros Phase (foci) of Withers (1954) on the Arkansas. Since this remains largely unpublished only brief mention of it is made in this study.

SPATIAL LOCUS (Fig. 6)

The Parker Phase is primarily confined to the South Platte Basin of Colorado which physiographically consists of the Front Range, Foothills, and Plains.

TEMPORAL LOCUS (Fig. 7)

Phase initiation for Parker estimated at A.D. 300-400 for the Plains and phase initiation may be placed slightly later at A.D. 500 for the adjacent Foothills. It is replaced at A.D. 900-1000 by Upper Republican on the Plains. In the Denver Basin and Foothills it is terminated by the Franktown Phase and Intermontane (Fremont) respectively (Wood 1967:635-40) at approximately the same time level.

ARTIFACT SYSTEM (Tables 31, 37, 39)

Projectile System

Unnotched

Unnotched points are fairly common. Usually they are convex-based, with straight or convex lateral edges.

Notched-Atlatl

Pelican Lake Corner Notched and Snyder-like forms occur infrequently in Parker. Some of the forms resembling Besant Side Notched are more properly classified as the obtuse shouldered form.

Notched-Arrow

The characteristic arrow point type is Parker Corner Notched which occurs either exclusively or very frequently in components assigned to the Parker Phase. Other forms which appear are Ruby Corner Notched, Scallorn, Samantha Side Notched, Timber Ridge Side Notched and Tri-Notched. Of these, only Ruby occurs frequently.

Biface System

Bifaces with modified hafting elements are represented by one corner

notched specimen from the Willowbrook component. Most of the forms classified as such from Magic Mountain are probably atlatl points rather than bifaces, at any rate they are the size of atlatl points.

The characteristic biface form is symmetric ovate-convex base. Other forms present are circular and symmetric ovate-straight base.

Drilling, Perforating, and Graving System

Irregular flake butt drills seem to be the characteristic type. Other forms are oval butt drills, ovate and irregular flake butt perforators and tit gravers.

End Scraper System

Dorsally finished forms are absent. The dorsally unretouched forms have a high frequency of convex lateral edges. In general there may be a slight tendency towards smaller, better finished forms. Bifacially finished end scrapers are present in Willowbrook and LoDaisKa.

Unifacial and Other Chipped Stone Tool Systems

Pointed unifacial flakes, and single-notched spokeshaves, bifacial choppers, cobble choppers and scraper planes are present. Pointed unifaces, domed side scrapers and other side scraper forms are absent.

Ground Stone System

Handstones and grinding slabs are present in large numbers. Other items include shaft-smoothers, an abrader and a pounder.

Bone Tool System (Table 39)

Ceramic System (Table 37)

Parker ceramics may be characterized as vertically or diagonally corded, undecorated conoidal vessels.

SETTLEMENT SYSTEM (Table 35)

Occupations are located in caves, rockshelters or on stream terraces. Cache pits are unknown. The characteristic hearth type is excavated and basin-shaped with a rock or earth fill. Surface hearths with rock fill are

also present.

No habitation structures were found in the open sites of the Parker Phase. Two houses, in the Graneros Phase on the Arkansas River, were excavated by Withers (1954). One is a circular, semisubterranean structure 18' in diameter, with a dry laid masonry coursing along 2/3 of the base of the wall, eight support posts set in the floor near the wall and a centrally located hearth. The other is a small oval pithouse with a covered entrance way on the east side.

SUBSISTENCE SYSTEM (Tables 40, 41)

Like the preceding Glendo and Willowbrook Phases, Parker hunting patterns are characterized by a primary emphasis on small ungulate hunting with a secondary reliance on bison. Collecting activities include plant collecting and fowling. Corn horticulture, as evidenced by cobs from LoDaisKa, was definitely practised and it may have formed a significant part of the diet. The lack of habitation structures suggests that Parker Phase populations should be characterized as generalized nomadic-hunter-gatherer-horticulturalists.

BURIAL SYSTEM (Table 38)

Like Glendo, Parker Phase burials may be characterized as single or multiple, primary flexed pit interments with a few utilitarian and ornamental grave goods.

SECTION 2: ASH HOLLOW PHASE

Eight components may be assigned to the Ash Hollow Phase (Table 8). For the purposes of this study both components from the Agate Bluff sites (Irwin and Irwin 1957) are classed together. Of the 8 components only Kelso, Ash Hollow D and Agate Bluff have yielded enough material for phase definition. The others--Hatch, White River, 25CE5, 25CE6, and D-1--indicate phase ditribution and may also add to the ceramic variance. White River is included because of Champe's (1946) reference to ceramics similar to those at Ash Hollow. Price (1956) considers that 25CE5 and

25CE6 may be related sites. 25CE6 also had 3 handstones and one grinding slab which may or may not be associated with the ceramics in the component.

SPATIAL LOCUS (Fig. 6)

The Ash Hollow Phase is located in the western part of the State of Nebraska, in the North Platte, Niobrara, and White River drainages. It is also present on the lower part of the South platte drainage in northeastern Colorado.

TEMPORAL LOCUS (Fig. 7)

Phase initiation is placed at A.D. 700 and phase replacement by Upper Republican at A.D. 900-1000.

ARTIFACT SYSTEM (Tables 31, 37, 39)

Projectile System

Unnotched

Unnotched points are common and consist of a variety of forms, straight lateral edge forms with straight or convex bases are most frequent.

Notched-Atlatl

Pelican Lake Corner Notched occurs rarely.

Notched-Arrow

Parker Corner Notched and Side- or Tri-Notched points are characteristic.

Stemmed-Arrow

A small, parallel-stemmed form is represented by two specimens from Ash Hollow (Champe 1946:Pl 12 j, k).

Biface System

Bifaces with modified hafting elements are absent. The characteristic biface form is symmetric ovate-convex base. Asymmetric lanceolates

also appear.

Drilling, Perforating, and Graving System

Irregular flake butt drills are the only form present.

End Scraper System

Forms tend to be smaller and more regular than the Glendo Subphase forms. Cross sections are triangular or flat. Lateral edges are straight. Dorsally finished specimens may be present in Agate Bluff. One is definitely present at Ash Hollow. A notched scraper similar to the Massacre Canyon form is present at Agate Bluff.

Unifacial and Other Chipped Stone Tool Systems

No data.

Ground Stone System

Handstones and grinding slabs are quite frequent. Abraders are the only other form present.

Bone Tool Systems (Table 39)

Ceramic Systems (Table 37)

In general we may characterize Ash Hollow Phase vessels as vertically corded, undecorated and conoidal. One particular type, known as Ash Hollow Cord Roughened, is characterized by a band of diagonally applied cord impressions on the lip-inner lip.

SETTLEMENT SYSTEM (Table 35)

Sites are rockshelters or open sites. No cache pits are recorded. Hearths are of two types--excavated basin-shaped rock-filled hearths, and surface hearths.

SUBSISTENCE SYSTEM (Tables 40, 41)

As in the Parker Phase, the hunting patterns are oriented toward small ungulates rather than bison. Collecting activities include shell fishing and plant gathering, both of which probably formed a significant

part of the diet. Fowling and fishing were also practised. Corn horticulture was probably practised and may have formed a significant part of the diet. Ash Hollow Phase populations may be characterized as nomadic hunter-gatherer-horticulturalists.

BURIAL SYSTEM (Table 38)

A later, intrusive secondary ossuary burial pattern appears superimposed on the earlier primary pit burials at Bisterfeldt. Here were found 3 ossuary pits with at least 34 secondary, disarticulated interments, two of which were burned. Shell disk beads are found with the burials. Similar pattern may also be present at 25SF10 (Neuman 1967a). This burial pattern appears either late in the Parker or Ash Hollow Phases or early in the following Upper Republican Phase.

SECTION 3: PURGATORY RIVER SHELTER

This site is south of the Parker and Ash Hollow sites in the Platte Basin. Many of the artifacts relate generally and specifically to the Parker and Ash Hollow Phases further north. The site is temporally equivalent to Ash Hollow and late Parker components, of about A.D. 800-900.

ARTIFACT SYSTEM (Tables 31, 39)

Projectile System

Unnotched

Unnotched forms are frequent, and are either straight lateral edge-straight base or convex lateral edge-concave base in shape.

Notched-Arrow

The component is characterized by Parker Corner Notched, Side Notched, and an obtuse shouldered form.

Stemmed-Arrow

Two points are the same form as that described for Ash Hollow C.

Biface System

Symmetric ovate-convex base is the characteristic form. Also present are asymmetric bipoint lanceolate and a lanceolate form.

Drilling, Perforating, and Graving System

Irregular flake butt and oval butt forms are present.

End Scraper System

The scrapers are small and well made with a number of oval outlines present. Five small dorsally finished forms are present. Bifacial scrapers may also be present.

Unifacial and Other Chipped Stone Tool Systems

Domed side scrapers and rectangular dorsally retouched side scrapers are present. Other tools include bifacial choppers and a heavy core uniface tool.

Bone Tool System (Table 39)

Of interest is the presence of long bone fleshers as these are not recorded for the Ash Hollow or Parker Phases.

Ceramic System

Sand temper is characteristic and exteriors are vertically cord roughened and partially obliterated. Interiors are plain or smoothed. Lips are smooth and flat; rims are vertical or flaring.

SETTLEMENT SYSTEM

Rockshelter occupation. No hearths recorded.

SUBSISTENCE SYSTEM (Table 40)

Generalized hunting gathering. Probably corn horticulture.

CHAPTER NINE

PATTEN CREEK AND KEYHOLE PHASES

These two phases, spatially adjacent to each other may in face be subdivisions of the same phase. However, lacking adequate information I shall consider each separately.

SECTION 1: PATTEN CREEK PHASE

The name for this phase is taken from the Patten Creek site which was excavated as part of the Hell Gap Project. Patten Creek is not yet published. Data on it were obtained by personal examination of part of the collection. The only other component is 48PL24-Upper (Table 9 No. 1).

SPATIAL LOCUS (Fig. 6)

The Patten Creek Phase is centered on the North Platte drainage in Wyoming.

TEMPORAL LOCUS (Fig.7)

The Patten Creek-Glendo interphase boundary is placed at A.D. 300-400. Phase termination is placed at A.D. 900-1000.

ARTIFACT SYSTEM (Table 31)

Projectile System

Unnotched

Unnotched forms are infrequent. When present, they are convex-based with straight or convex lateral edges.

Notched-Atlatl

Pelican Lake Corner Notched and Besant Side Notched are present. The latter is represented by a single specimen.

Notched-Arrow

Scallorn is the characteristic type. Other types present indlude Ruby Corner Notched, Samantha Side Notched, Parker Corner Notched and Timber Ridge Side Notched. Flake points are represented by one specimen.

Biface System

Bifaces with modified hafting elements are represented by a Thompson Biface. The characteristic biface type is symmetric ovate with convex or straight bases. Other forms include triangular convex base and rectanguloid.

Drilling, Perforating, and Graving Systems

Ovate perforators are present.

End Scraper System

Forms which have been completely retouched dorsally are very rare. In outline, they are quite large, triangular or rectangular in form, with convex cross and longitudinal sections and straight lateral edges.

Dorsally unfinished forms are large, with irregular to rectangular or triangular outlines, straight, angular or irregular cross and longitudinal sections and irregular to convex or straight lateral edges. Retouching is primarily confined to the distal end, although some lateral edge retouch may be present.

Unifacial and Other Chipped Stone Systems

Pointed unifacial flakes, pointed unifaces, single and double notched spokeshaves, domed side scrapers dorsally finished side scrapers and bifacial choppers are present.

Ground Stone System

Handstones and grinding slabs are present.

Bone Tool System

No data.

SETTLEMENT SYSTEM (Table 35)

Sites are located on stream or river terraces. The presence of tipi rings at 24PL24-Upper indicates the probable use of a skin-covered tipi as a habitation structure. The characteristic hearth type at 48PL24-Upper is an excavated rock-filled basin or bucket-shaped hearth.

SUBSISTENCE SYSTEM (Table 41)

The lack of bone preservation at 48PL24-Upper negates any inferences to the primary ungulate hunted. Most probably the orientation is the same as in the preceding Glendo Subphase. The presence of handstones and grinding slabs indicates the utilization of wild plants and possibly some corn horticulture.

BURIAL SYSTEM (Table 38)

The burial system is characterized by primary pit interments with associated utilitarian and ornamental grave goods.

SECTION 2: KEYHOLE PHASE

The name Keyhole is derived from the Keyhole Reservoir in which components of this phase have been recorded.

Four habitation sites contain components which are placed in the Keyhole Phase (Table 9 No. 2). Of these, only McKean II is an excavated sample. Even so, it appears to be mixed, and consequently is of limited usefulness for phase definition. Surface sites--48CK10 and 48CK35--are probably single components.

SPATIAL LOCUS (Fig. 6)

The spatial distribution is difficult to define as all known components are from the Keyhole Reservoir. For the purpose of this study, it is defined as occupying the northeast corner of Wyoming, in the Powder River, Little Missouri and Belle Fourche drainages.

TEMPORAL LOCUS (Fig. 7)

Phase initiation is placed at A.D. 500-600 and phase termination at A.D. 900-1000.

ARTIFACT SYSTEM (Table 31)

Projectile System

Unnotched

Convex lateral edge points with convex or straight bases are probably present.

Notched-Arrow

Scallorn is the characteristic type. Other types which may be present are: Ruby Corner Notched, Parker Corner Notched, Columbia Valley Corner Notched and Timber Ridge Side Notched.

Biface System

Symmetric ovates with convex or straight bases are the characteristic forms. Other forms present are: lanceolate and triangular convex base.

Drilling, Perforating and Graving System

No data.

End Scraper System

The single dorsally finished end scraper from McKean might relate to this phase. The end scrapers otherwise correspond to those of the Upper Miles Subphase.

Other Artifact Systems

Bifacial choppers and scraper planes are present.

SETTLEMENT SYSTEM (Table 35)

Sites are located on terraces or river bluffs. Some of the excavated rock-filled hearths at McKean probably pertain to this phase.

SUBSISTENCE SYSTEM

Substantive data is lacking.

CHAPTER TEN

TODD AND WILLOWBROOK PHASES

The Todd and Willowbrook phases belong to separate "non-plains" cultural traditions, and are grouped together for purposes of description only.

SECTION I: TODD PHASE

The name Todd is proposed for this phase of the Big Horn-Shoshone Basin, as the best described collections for the phase comes from the Todd Site, 48FR89, located in the Boysen Reservoir (Wheeler 1958).

Of the 12 excavated components assignable to this phase (Table 10 No. 1), only 48FR33 is considered to be of little value as it is culturally mixed. Only projectile point data are available for Mummy Cave. Components in certain cases--Birdshead E, D, and 48FR5-Upper--are assigned to this phase on minimal evidence.

SPATIAL LOCUS (Fig. 6)

The Todd Phase is present in the Bighorn and Shoshone basins.

TEMPORAL LOCUS (Fig. 7)

Phase initiation is placed at A.D. 500-600 and phase termination at A.D. 900-1000.

ARTIFACT SYSTEM (Tables 30, 39)

Projectile System

Unnotched

Unnotched points are quite common. The characteristic forms are convex bases with straight or convex lateral edges.

Notched-Atlatl

The characteristic form is Columbia Valley Corner Notched. Other forms present include Ruby Corner Notched, Timber Ridge Side Notched, flake points, and side notched.

Biface System

Bifaces with modified hafting elements are represented by Duncan. The characteristic biface form is symmetric ovate convex base. Straight

based forms are infrequent. Other forms present include triangular straight base, ovals, asymmetric ovates, lanceolate, rectanguloid and asymmetric lanceolate. The latter is represented by a single specimen from Mangus III.

Drilling, Perforating, and Graving System

Irregular flake but drills and tit gravers are present.

An unusual form present at 48FR23 is a basally barbed notched butt drill. This is similar to one from Deluge Shelter Level 3 (Leach 1967) and one from Danger Cave V (Jennings 1957:Type W86).

End Scraper System

End scrapers are not particularly common and little difference can be discerned between them and those from Spring Creek. Dorsally finished forms are not recorded as present. Scrapers in Mangus III tend to be circular in form and manufactured from irregular flakes.

Unifacial and Other Chipped Stone Tool Systems

Handstones and grinding slabs are quite frequent. Other tools include a grooved maul and a shaft smoother.

Bone Tool System (Table 39)

SETTLEMENT SYSTEM (Table 35)

Sites are located in rockshelters or on stream terraces. Cache pits are absent. The characteristic hearth types are excavated basin-shaped with rock or earth fill, and stone platform hearths. Other variants include an oven, stone-edged surface hearths and surface burns.

SUBSISTENCE SYSTEM (Tables 40, 41)

Hunting and gathering patterns are probably the same as in the previous Spring Creek Subphase, with differential seasonal exploitation of montane life zones. The presence of notched pebbles suggests that riverine resources were exploited. The Todd Phase populations may be characterized as generalized nomadic hunter-gatherers.

BURIAL SYSTEM

One fissure burial, the Turk burial, is assignable to the Todd Phase. Associated with 4 adults and 1 infant in the fissure were 4 serrated Columbia Valley Corner Notched points, 1 Besant Side Notched, 1 point tip, 1 end scraper and 14 bone beads.

SECTION 2: WILLOWBROOK PHASE

The Apex complex of the Colorado Foothills, as defined and discussed by Irwin-Williams and Irwin (1966) and Irwin-Williams (1967), is conceived as a northern variant of the Picosa Cultrue (Irwin-Williams 1967) with its primary relationship towards the southwest or mountainous area rather than to the Northern Plains. The concept has met with opposition from some workers in Colorado (J. J. Wood 1967), who prefer to see its primary relationships to the Northern Plains rather than Southwest.

Three excavated components of the Apex complex (Table 10 No. 2) are relevant to the present study. Since the Apex complex itself encompasses a considerable time depth, and in this study I am concerned only with the Late Apex ca. 1000-800 B.C. to A.D. 1 (Irwin-Williams and Irwin 1966:199) the terminal portion of the Apex complex is designated the Willowbrook Phase, after the Willowbrook site (Leach 1966).

SPATIAL LOCUS (Fig. 3)

For the purposes of this study, the Willowbrook Phase is confined to the Foothills and the adjacent Colorado front range within the Platte drainage.

TEMPORAL LOCUS (Fig. 7)

Evaluation of the dates suggest that the Irwins' placement of Late Apex is essentially correct. Phase initiation is placed at ca. 1300-1000 B.C. and phase termination at ca. A.D. 400-500.

ARTIFACT SYSTEM (Tables 30, 39)

Projectile System

Unnotched

Unnotched points have not been described for the three components assigned to the Willowbrook Phase. In the case of LoDaisKa C, and Magic Mountain B and C, it may not be attributable to sampling or cultural variation as the Irwins (1966) may well have called them "small ovates" or "small triangular" bifaces. In Willowbrook it is probably attributable to sampling, as unnotched points are present in comparable levels in Deluge Shelter (Leach 1967).

Notched-Atlatl

Pelican Lake Corner Notched are fairly frequent. Other forms are recurvate body edge, obtuse shouldered and the nubbin base stemmed form.

Biface System

Bifaces with modified hafting elements are absent. The characteristic biface forms are symmetric ovate convex base, and triangular with convex or straight bases.

Drilling, Perforating, and Graving System

Irregular flake butt drills and perforators and tit and notched gravers are present.

End Scraper System

Dorsally finished forms are absent. Bifacial scrapers are present in two components; Willowbrook and LoDaisKa. Dorsally unretouched scrapers vary in form from oval to circular, with regular to irregular cross and longitudinal sections. Convex lateral edge forms predominate over other edge shapes.

Unifacial and Other Chipped Stone Tool Systems

Absent are spokeshaves, pointed unifaces and domed side scrapers. Pointed unifacial flakes, bifacial and cobble choppers are present.

Ground Stone System

Handstones and grinding slabs are quite frequent.

Bone Tool System (Table 39)

SETTLEMENT SYSTEM (Table 34)

Sites are rockshelters or on open terraces. Structural habitation features and cache pits are absent.

Surface hearths with rock fill are characteristic. In Willowbrook these have a stone edging.

SUBSISTENCE SYSTEM (Tables 40, 41)

Willowbrook is characterized by a hunting pattern based primarily on small ungulates. Bison are secondary. Plant collecting and fowling activities probably contributed significantly to the diet. Corn horticulture was definitely practised as corn cobs have been recovered from LoDaisKa. One may characterize the populations as nomadic hunter-gatherer-horticulturalists.

BURIAL SYSTEM

Only 2 components--Magic Mountain B and C--yielded burials. Magic Mountain B is characterized by a primary flexed pit interment. Associated grave goods were 6 Olivella shell beads. This burial may, however, be associated with the Parker Phase component of Zone B. The Zone C burial, was a secondary stone cairn burial. Two grinding slabs were included in the cairn construction.

CHAPTER ELEVEN

SUMMARY AND SPECULATIONS

The following sections are mainly concerned with a comparison and attempt to understand the internal and external areal relationships of the various phases or subphases proposed in the preceding chapters. For ready interphase comparisons, various cultural systems are summarized on the phase level in Tables 32, 36, 37, and 41.

SECTION 1: PELICAN LAKE PHASE

The Pelican Lake Phase, comprised of a number of regional subphases, occupies the northern half of the Great Plains and certain adjacent areas of the northern Rocky Mountains from 1000 B.C. to approximately A.D. 100.

Briefly, the more significant cultural subsystems of the Pelican Lake Phase may be summarized as follows:

(1) Relative high frequency of unnotched projectile points of a variety of forms.

(2) High frequency of Pelican Lake Corner Notched points, and the occasional presence of obtuse shouldered side notched points and stemmed forms. Flake points are infrequent.

(3) Varied but rare forms of bifaces with modified hafting elements.

(4) Relatively high frequency of symmetric-ovate-convex or straight base bifaces. Other forms are rare but occur in a variety of other forms.

(5) Rare or irregular flake butt, T-butt, and oval butt drills and a variety of perforator and graver types.

(6) High frequency in most regional subphases of dorsally unretouched end scrapers. Many have oval to circular outlines.

(7) Presence of pointed unifacial flakes, pointed unifaces, domed side scrapers and bifacial choppers.

(8) High frequency of excavated basin- or bucket-shaped earth- or rock-filled hearths which may on occasion have stone linings or edgings.

(9) A high frequency of handstones and grinding slabs in the Spring Creek, Upper Miles, and particularly the Glendo subphases, which may relate to incipient corn horticultural practices.

(10) A burial pattern characterized by primary flexed interments

with few accompanying grave goods. The only data for this burial pattern come from the Glendo Subphase.

The subphases of the Pelican Lake Phase may be conceptualized as representing a series of regionally adapted societies who participated to a greater or lesser extent in an overall unifying cultural tradition.

Although earlier archaeological expressions in the Northern Plains are not the concern of this thesis, one must, in order to place the Pelican Lake Phase in proper cultural prespective, briefly consider the earlier Hanna and McKean complexes. Examination of Signal Butte 1A and 1C components (Forbis n.d.) indicates good continuity in such formal systems as irregular flake butt and T-butt drills, ovate symmetric convex or straight base bifaces, pointed unifaces, bifaces with modified hafting elements, and domed side scrapers. The Belle Rockshelter and Mule Creek McKean-Hanna components (Wheeler 1958:Part II) also show continuity in excavated basin-shaped, rock-filled hearths. Also a gradual change from Hanna to Pelican Lake points marks the emergence of the Pelican Lake Phase.

One may then conceive of the Pelican Lake Phase as a serial phase of a cultural tradition exhibiting continuity of systems which lasted some two and one-half millenia. This cultural tradition, which I propose be termed "TUNAXA," may tentatively be divided into three temporal phases--McKean, Hanna, and Pelican Lake. Like Pelican Lake, both McKean and Hanna are conceptualized as being composed of a number of regional subphases. Not all sites containing McKean or Hanna points should be assigned to this tradition until a formal analysis of all extant cultural systems has been made, as there is no necessary correlation between point types and a cultural tradition.

If the Pelican Lake Corner Notched point type did not develop out of the preceding Hanna point type, it may have come from one of several sources. In the eastern Woodlands, barbed corner notched points are present in the Late Archaic (Ferry Site, Fowler 1957:Fig. 5 A, B, C, D; McCain Site, Dragoo 1959:Fig. 33; and the Faulkner Focus, MacNeish 1948: Fig. 47:9-12); in Early Woodland (Baumer Focus, Griffin 1952a:Fig. 96:4;

Black Sands, Cole and Deul 1937:Fig. 28a 15); in Middle Woodland (Renner, Wedel 1953:Pl. 12 a-i; Steuben, Morse 1963:Pl. 7 Fig. 1, 2--Snyders Corner Notched and Marshall Barbed; Clear Lake, Fowler 1952:Pl. 46 A, and Havana, MacGregor 1952:Pl. 19 A-F, H, I). In the eastern Woodlands it is associated with a variety of stemmed and side notched forms.

To the west, British Columbia, forms nearly identical to the Mortlach Subphase variant were found in a pit house at the Arrow Lakes dated 1265 B.C. ± 180 (GX1197) (Turnbull pers. comm.). Farther south, in central Idaho, the barbed corner notched form is present both above and below Mazama Ash (6700 B.P.) in the Shoup Rockshelter (Swanson and Sneed 1966: Fig. 18 m-o; Fig. 20 e, f). In the Birch Creek Valley the form occurs at 10CL100 as early as 1220 B.C. ± 80 (UCLA-256) (Swanson, et al. 1964:Fig. 36 w-z). In Deluge Shelter, colorado, it appears in Level 2 as early as 1890 B.C. ± (GX-898) (Leach 1967:Types 4a, 4b), and in Danger Cave (Jennings 1951:Types W25, W22, W19, W18). Barbed corner notched points appear at Mummy Cave in Layer 16 (5680 B.C. ± 170 B.C.) (I-1588) and Layer 29 (3305 ± 140 B.C.) (I-1429) and Layer 25. In all instances cited above the barbed corner notched from is associated with a variety of other forms which may include stemmed and side notched types.

In the Southern Plains, barbed corner notched forms are represented in the following types: Castroville (ca. 4000 B.C.-A.D. 1000, Suhm and Jelks 1962:173-174); Edgewood (Late Archaic, B.C. or early A.D., Suhm and Jelks 1962:183-184); Ellis (ca. 1000 B.C. to A.D. 500-1000 Suhm and Jelks 1962:187-188); Ensor (ca. 2000-1000 B.C. to A.D. 500-1000 Suhm and Jelks 1962:189-190); Marcos (ca. 2000 B.C.-A.D. 1000 Suhm and Jelks 1962:209-210); Marshall (ca. 4000-3000 B.C. to A.D. 1000 Suhm and Jelks 1962:211-212); and Williams (ca. 4000 B.C.-A.D. 1000 Suhm and Jelks 1962:259-260). Thus it seems impossible to isolate at present any one area from which the barbed corner notched point may have been introduced into the plains.

The sharpness of some subphase boundaries and local adaptions may be illustrated by the different lithics utilized in the Mortlach and Blue Slate Canyon subphases. Only 48 miles separate the Head-Smashed-In components of the Mortlach Subphase and the Blue Slate Canyon components

in Waterton Park. Avon chert, which represents 40-50 per cent of all lithics utilized in the Blue Slate Canyon components in Waterton, is represented by less than 2 per cent of the points at Head-Smashed-In. Kootenay Argillite, present at Head-Smashed-In, is represented by one or two specimens in Waterton. Other Head-Smashed-In lithics, such as the black and brown cherts and blue chalcedonies, have exceptionally low frequencies in Waterton, even though probable source areas lie only some 30 miles north of Waterton. Further, lithics indicate that the Blue Slate Canyon Subphase had relatively little contact with the Keaster Subphase as Avon lithics do not occur in Keaster samples examined in southern Montana. Also the Keaster red and grey siltstones do not occur in Blue Slate Canyon components.

The evidence suggests that the Blue Slate Canyon Subphase is adapted to the mountains and foothills, subsisting primarily on the communal hunting of bison, participating in the TUNAXA cultural tradition but engaging in relatively little lithic trade with adjacent regional subphases.

Like Blue Slate Canyon, the Mortlach Subphase in southern Alberta has a Plains-Mountain adaptation. For many lithics utilized are types found in the Rocky Mountains. These same lithics occur in association with the Mortlach point variant in the Rocky Mountain trench. Also in association in these areas are Kootenay Argillite points. Like Blue Slate Canyon, Keaster lithics are infrequent or absent suggesting little trade with adjacent subphases of the TUNAXA tradition. However, the occasional presence of obsidian in both Blue Slate Canyon and Mortlach indicates that some trade was going on with the southern areas.

The Spring Creek Subphase exhibits certain formal relationships with sites in the Great Basin area. The concave lateral edge, barbed shoulder, straight or concave base Spring Creek Pelican Lake Corner Notched variant resembles Type W20 from Danger Cave (Jennings 1957:117) and Piney Springs Type TB11 (Sharrock 1966:60-61). Jenning's W18 and W19 and Sharrock's TB4 and TB8 are quite like the Spring Creek variant of the Pelican Lake Corner Notched type. The single side notched form present in Spring

Creek is present and more common in Danger Cave V and Piney Springs. Point workmanship is quite similar. Calcite atlatl weights from Spring Creek are identical to a specimen from Piney Springs (Sharrock 1966:Fig. 59). Other formal items found in Spring Creek and the Piney Creek Site include T-butt drills and domes side scrapers. Spring Creek items such as pointed unifaces are absent and dorsally finished end scrapers are very rare. All these are absent in Deluge Shelter and Danger Cave. These sites plus other contemporary components in the Great Basin and adjacent mountains contain a large number of different, functionally equivalent form-function systems.

From the above one may assume that the evidence indicates considerable contact between indigenous populations participating in different cultural systems rather than regional expressions of the same cultural system. For if Spring Creek was a regional expression of the cultural systems present in the Great Basin and mountains, we should expect the same variety of form-function systems in Spring Creek as in the latter area, especially the point types variation. For example, in the Beaverhead Phase (1000 B.C.-A.D. 400), of the Birch Creek Valley in Idaho, a variety of point types including Elko Eared, Bitterroot Side Notched, lanceolate and stemmed indented types are found associated with the barbed corner notched forms (Swanson et al. 1964).

In comparison to the above contact situation, little contact can be inferred between the Glendo Subphase and the Willowbrook Phase of the Picosa Culture in the Colorado Foothills. It is evident that Willowbrook relationships are to the west. Level 5 at Deluge Shelter, A.D. 355 $\pm$ 95 (GX-0896) (Leach 1967), contains the typical Willowbrook recurved body edge and side notched point forms. Level 6 at Deluge contained the Nubbin base form. Also Morris and Burgh (1954) illustrate similar forms for Basketmaker II sites. Triangular convex base bifaces are also in Deluge 5 and 6, and Basketmaker II sites. Bifacial end scrapers are also present in Deluge Shelter.

Very little similarity aside from their sharing the barbed corner notched point in form-function systems exists between Glendo and Willow-

brook. A Nubbin base form, obtuse shouldered forms and a triangular convex base biface present in Glendo may be interpreted as evidence of contact between the two. Many other formal systems differ significantly. My interpretation, therefore, supports Irwin-Williams' thesis that the primary cultural relationships of Late Apex (Willowbrook Phase) are to the mountainous west and southwest rather than to the Northern Plains as has been suggested by some workers (J. J. Wood 1967).

To conclude, the Pelican Lake Phase represents a series of local-adapted nomadic, hunting-gathering populations, each of which, while slightly different, participates in an ongoing cultural tradition, "TUNAXA." In genreal it occupies the Northern Plains and adjacent foothills and mountains. Its relationships to sequent pahses will be discussed later.

SECTION 2: BESANT PHASE

Geographically, Besant is more restricted (Fig. 4) than Pelican Lake (Fig. 1). Contemporaneous with Besant to the south are the ceramic horticultural phases--Valley, Keith, and Parker (Fig. 6). In the Manitoba Parkland, the Anderson-Nutimik Phase (Fig. 5) is present. Besant is absent in the Big Horn and Shoshone Basins, in the North Platte Basin of Wyoming, and in the mountainous areas adjoining the plains, although the Avon quarries provided raw material, utilized by Besant artisans at Avon and other sites. It is generally absent in southern Montana.

Dated about A.D. 1, Besant is earliest on the Middle Missouri (Fig. 7). It appears approximately 100 years later in the Upper Missouri and Saskatchewan Basins where the earliest Besant dates overlap with the latest Pelican Lake dates. The phase terminates differentially across the area.

Briefly the characteristics are as follows:

(1) Low frequency of unnotched points (usually one type).

(2) Besant Side Notched (atlatl) and Samantha Side Notched (arrow) projectile points. No stemmed forms and few of Pelican Lake Corner Notched points. Flake points are common.

(3) Few discrete types of bifaces with modified hafting elements.

(4) High frequency of asymmetric ovate bifaces.

(5) High frequency of small dorsally-finished end scrapers.

(6) Distinctive drill types--pentagonal and triangular.

(7) Absence of pointed unifacial flakes, domed side scrapers, pointed unifaces; few bifacial choppers.

(8) Rare and localized cord-marked bossed and/or punctated conoidal pottery vessels.

(9) Presence of excavated basin-shaped earth-filled hearths but absence of excavated basin- or bucket-shaped rock-filled hearths. Surface hearths are common. Presence of cache pits, house structures (two sites), and bone uprights.

(10) Secondary burials, usually accompanied by many grave goods, in a central subfloor log-covered tomb, under an earth mound.

As for Besant's origins, two general propositions may be presented:

(1) The Besant phase is a sequent pahse in the TUNAXA cultural tradition and it either (A) develops from the Pelican Lake Phase or (B) develops from one of the regional subphases.

(2) The Besant Phase is part of a cultural tradition unrelated to TUNAXA which is either (A) a plains adapted tradition or (B) is an intrusive cultural tradition from some other area.

One must, in evaluating 1A, 1B, 2A, and some alternatives in 2B, consider only those cultural systems which could not be introduced into an indigenous plains tradition through contact with Middle Woodland cultures. These specifically include ceramics, habitation structures, and the mound burial pattern.

Hypothesis 1A

If Besant developed from Pelican Lake, one should expect components lying along the interphase boundary to be intermediate in form-function systems.

1. Pelican Lake points occur in Besant components and Besant points occur in Pelican Lake components [i.e., Pelican Lake Phase--acceptable ("pure") associations: 48PL23, Stark Lewis 3, Blue Slate Canyon, and

Head-Smashed-In (early association); unacceptable ("mixed") associations: Ludlow and Medicine Creek Caves, McKean, Head-Smashed-In (late association) and Old Women's. Besant acceptbale associations: Stelzer and Ruby; unacceptable ("mixed"): Mortlach 4A, 4C, 4D, 4E, Kenney 8, Old Women's, and Head-Smashed-In]. When good stratigraphic control exists, the frequency of either type in components characterized by the other type is extremely low. Further, both acceptable and unacceptable associations except the Besant points in early Pelican Lake components at Head-Smashed-In are temporally equivalent to "pure" components of either phase, even though within any one specific region there may be no temporal overlap between the two phases. If they were sequent phases of the same cultural tradition, sites within any one region should show a gradual change in point style from Pelican Lake to Besant. This does not seem to be the case, and one may interpret this evidence as representing extremely rapid acceptance of a new point type, or phases of separate cultural traditions. The occurrence of one point type in components of the other phase may then be interpreted as the result of contact between the two cultures.

2. Pelican Lake form-function systems such as bifaces with modified hafting constrictions, drill types, unifacial pointed flakes, pointed unifaces, bifacial choppers, domed side scrapers, and excavated, basin-shaped rock-filled hearths span two millenia in the TUNAXA cultural tradition. Presumably they were not only highly functional, but occupied symbolic positions in the ideological system. If Besant were a sequent phase in the TUNAXA cultural tradition these forms should continue, but they do not, indicating that they probably belong to separate cultural traditions. This is not to say that functional equivalents to these forms are not present in Besant.

3. Other items such as asymmetric bifaces and dorsally retouched end scrapers show some continuity between the phases. However their distribution in Pelican Lake is generally confined to certain subphases and they are not characteristic of the phase as a whole. Also they are very widespread elsewhere at this time level (e.g., Boreal Forest and areas of the Eastern Woodlands).

4. If Besant represents a sequent phase in the TUNAXA cultural tradition, phase transition need not occur at the same time throughout the area in which Besant is present, but one expects components along the bounday to exhibit a gradual change in artifact and other cultural subsystems from the Pelican Lake to Besant assemblage. This does not happen.

Hypothesis 1B

Three Pelican Lake Subphases--Mortlach, Larter, and Badger--are most similar to Besant.

1. Mortlach and Badger components exhibit a high frequency of small dorsally retouched end scrapers. They compare favorably in frequency and form with Besant. A particular dorsally finished "domed" variant present in the Mortlach and Long Creek components is absent in Besant. Mortlach and, to a lesser degree, Larter, contain asymmetric ovate bifaces similar to those found in Besant.

2. At Head-Smashed-In, three Besant Side Notched points differing slightly in metric and nonmetric configuration were found in Pelican Lake components dating to the early half of the first millenia B.C. A number of Besant Side Notched points also occur in terminal Pelican Lake components at Head-Smashed-In. The stratigraphy at this level is complex and many of these points may be associated with the Besant component rather than Pelican Lake. However, pure Pelican Lake components separate the early occurrences from these later associations.

The components assigned to the Besant Phase at Mortlach contain some Pelican Lake points. However the placement of projectile points by Wettlaufer in the Mortlach site report does not entirely correspond with the level designations on the same projectile points examined by the writer. Five points are cataloged from Level 4E but the published report states that only two were found (Wettlaufer 1956:52). The point illustrated in Pl. 10 2 for Level 4E is cataloged as 4D. One point and one base cataloged as from Level 4E are not illustrated in the report, and two Pelican Lake Corner Notched assigned by Wettlaufer to Level 5 (Pl. 11 5) are cataloged as 4E. A Pelican Lake Corner Notched assigned to Level 5 (Pl. 11 3) is catalogued as 4D.

Placing the points according to Wettlaufer gives the following sequence for the Besant components: 4A--3(+) Besant, 1 Pelican Lake (intrusive); 4B--3(+) Besant; 4C--1 Pelican Lake (intrusive); 4D--4 Besant, 1 possible Pelican Lake fragment (intrusive); and 4E--2 Besant (Sandy Creek). The forms from 4E have been called Sandy Creek by Wettlaufer, however the writer sees no important difference between these and Besant Side Notched as defined in this study.

According to their catalog designation the following is the sequence: 4A--6 Besant, 1 Pelican Lake; 4B--6 Besant; 4C--2 Besant, 1 Pelican Lake; 4D--4 Besant, 1 Pelican Lake; and 4E (Wettlaufer's Sandy Creek "Culture")--3 Besant, 2 Pelican Lake. Level 5 (Pelican Lake) is represented by 4 Pelican Lake points.

Clearly something is wrong and the association of Besant and Pelican Lake points as evidence of cultural continuity between the Mortlach Subphase components and Besant Phase components in the Saskatchewan Basin must await further clarification. If the stratigraphic associations are correct, then the Walter Felt 13 and 15 may be interpreted as representing the gradual innovation of an ancestral "Obtuse Shouldered" variant into the Mortlach Subphase. Later components such as Mortlach 4E and the terminal Mortlach Subphase components and Besant Phase components at Head-Smashed-In and Kenney represent later components in this transition. The present evidence indicates that Besant belongs to a separate cultural tradition and is not part of the TUNAXA cultural tradition. In summary of, and, in addition to data previously presented, I offer the following evidence in support of this hypothesis. The reader is also referred to summary Tables 32, 38, and 41.

(1) The differential spatial distribution of the two phases. In the Northern Plains area, occupied sequentially by Pelican Lake and Besant, the Besant Phase seems to be more restricted in area or intensity of occupation than Pelican Lake. Also Besant points are much more numerous in the Saskatchewan Basin and northern Montana regions than in southern Montana, northeastern Wyoming, or the Northern Rockies. This evidence indicates that the major area of Besant occupation was restricted to the former region.

(2) Besant is earliest on the Middle Missouri and later to the west where certain Pelican Lake dates are coeval or even later than the earliest Besant dates. Possibly the spread of Besant represents an actual physical movement of a population westward into the Upper Missouri and Saskatchewan basins.

(3) Artifact System.

a) Variety of forms and relative high frequencies of unnotched points exists in Pelican Lake, but not in Besant.

b) Occurrence of Pelican Lake Corner Notched in Besant Phase components or Besant Side Notched in Pelican Lake components may represent contact which may or may not be hostile and could quite conceivably represent interchange of persons, ideas, and/or material items.

c) Stemmed points of specific Pelican Lake form are absent in Besant and flake points are rare in Pelican Lake compared to Besant.

d) Bifaces with modified hafting elements are mutually exclusive in form between the two phases.

e) Symmetric ovate bifaces are frequent and other biface types occur sporadically in Pelican Lake. In contrast, Besant has a high frequency of asymmetric ovates and other biface types not found in Pelican Lake.

f) Dorsally unretouched end scrapers are frequent in Pelican Lake, as are circular to elliptical forms. In Besant dorsally retouched end scrapers are frequent and forms are triangular or rectangular.

g) T-butt and oval butt drills are characteristic of Pelican Lake, and pentagonal and triangular drills of Besant. Irregular flake perforators are present and common in Pelican Lake. Ovate and triangular perforators are characteristic for Besant.

h) Pointed unifacial flakes, pointed unifaces, domed side scrapers, and high frequency of bifacial choppers occur in Pelican Lake. They are virtually absent in Besant. The single occurrence of a pointed uniface at the Ruby Besant component could represent contact between the two traditions.

i) The single occurrence of ceramics in the Mule Creek component of the Upper Miles Subphase may represent contact with the Besant Phase.

(4) Bone uprights occur only in Besant. Excavated basin-shaped rock-filled hearths occur only in Pelican Lake.

(5) Lithics.

In collections from the Upper Missouri and Saskatchewan basins some obvious differences between the two phases can be seen in hand specimen observation.

Obsidian is generally absent in Besant, which may be interpreted as indicative either of inaccessibility to the primary source, or the absence of trade relationships with groups controlling the Yellowstone quarries. Since obsidian is present in Middle Woodland cultures (p. 191) contemporaneous with Besant, its value in trade may have outweighed its superior utility in flint knapping for Besant artisans. Although obsidian usage on the Plains declines away from the Yellowstone quarries (Davis pers. comm.), it is considerably more frequent in the Pelican Lake regional subphases.

The grey and red siltstones common in the Keaster and Upper Miles Subphases are generally lacking in Besant components in Montana as are the Mortlach Subphase Rocky Mountain cherts in Besant Phase components in southern Alberta. The cultural preference by Besant for Knife River flint and related varieties is clear. In comparison, Knife River flint is considerably less frequent in Pelican Lake components of the Upper Missouri and Saskatchewan basins.

Hypothesis 2A

Besant represents a separate Plains cultural tradition.

Since some Besant sites contain ceramics, habitations, and burial mounds, it could conceivably be an extension of the Valley Phase. While Loseke Creek largely postdates Besant, there are strong resemblances possibly indicative of contact between the two which will be evaluated along with Besant-Valley relationships.

Besant on the Middle Missouri is spatially adjacent to Valley and phase initiation for both is placed at A.D. 1-100. Similarities between the two are:

1. The relative low frequency of unnotched points and the presence

of convex lateral edged-straight base forms in Besant and Valley-Loseke.

2. The presence of Besant Side Notched points in Valley and Loseke.

3. High frequency of asymmetric ovates and rectangular bifaces in both traditions.

4. Presence of irregular flake butt drills in Besant and Valley. Presence of pentagonal and triangular drills and ovate perforators in Besant and Loseke.

5. Loseke and Besant are similar in having a high frequency of dorsally finished end scrapers. Many of the Loseke forms are the same as the small triangular or rectangular Besant forms.

6. Presence of cord-roughened bossed or punctated conoidal vessels in Besant, Valley, and Loseke.

7. Presence of similar habitation structures and cache pits in Besant, Valley, and Loseke. Presence of surface hearths in Besant and Valley, and excavated basin-shaped earth-filled hearths in Besant and Loseke.

8. A secondary submound burial pattern is present and characteristic of all three. Besant and Loseke both have considerable grave goods and hold some specific forms in common, i.e., conch, Olivella and Dentalium shell ornaments.

Differences between the two are:

1. The absence in Besant of convex lateral-edge convex-base unnotched points present in Valley and Loseke.

2. In Valley and Loseke the frequencies of Besant Side Notched and Pelican Lake Corner Notched are approximately equal. In contrast, Pelican Lake Corner Notched are very rare in Besant components in the Middle Missouri.

3. Bifaces with modified hafting elements, although present both in Besant and Loseke, are mutually exclusive in their shape.

4. The straight-based oval bifaces found in Besant are absent in Valley and Loseke. The Loseke circular, ovoid, triangular, and trianguloid forms are absent in Besant.

5. Dorsally finished end scrapers, common in Besant, are absent in

Valley. In Valley and Loseke there is a relatively high frequency of ovate- or oval-shaped end scrapers.

6. The general absence in Besant of pointed unifaces, domed side scrapers, dorsally finished rectangular side scrapers and bifacial choppers. These forms are all present in Loseke.

7. Valley ceramic motifs such as cord-wrapped rod and punctated lips are absent in Besant as are the Loseke core-impressed and incised motifs.

8. Valley and Loseke may be characterized as semisedentary hunter-gatherer horticulturalists, whereas Besant may be characterized as nomadic hunter-gatherers.

9. In contrast to the abundance (relative) of a variety of grave goods in a limited region of Besant, Valley is characterized by a very few grave goods all of a utilitarian character. The ornamental grave goods found in Besant are completely absent in Valley. In addition the Besant burial pattern is characterized by secondary interments in central subfloor pits with log covers usually with associated bison remains. Valley and Loseke are characterized by a much more variable burial pattern. Log-covered pits are absent in Valley and only rarely occur in Loseke.

The evidence summarized above probably indicates that Besant and Valley-Loseke represent separate cultural traditions. Similarities in ceramics and habitations may be the result of similar contact with Middle Woodland communities to the east. One might interpret the more elaborate mortuary pattern in Besant to be indicative of more intensive participation in the Hopewellian Interaction Sphere.

The presence of Besant Side Notched points in Valley may be indicative of contact with Besant or diffusion of a point type and acceptance of these forms by Valley. In Loseke the presence of Besant Side Notched, pentagonal and triangular drills, small regular dorsally finished end scrapers and burial mounds with central subfloor rectangular pits with log covers may be indicative of contact between Besant and Loseke. It seems clear that considerable contact and interaction occurred between the two traditions.

Since Besant does not seem to be related to the Valley or Pelican

Lake Phases, one may look to the Dakota-Iowa area for earlier components of a separate plains cultural tradition.

Points illustrated by McKussick (1964) for the Keg River or Humboldt complexes do not look particularly like Besant Side Notched projectile points. The projectile point from the Archaic Turin burial exhibits considerable nonmetric similarity to Besant (McKussick 1964:Fig. 4:1). This burial, located in Monona County, dates to 2700 B.C. and consists of primary flexed interments in red ochre-lined pits. The projectile point, a clam shell and a few hackberry seeds were associated (McKussick 1964: 72).

The Turin point is not dissimilar in form from the V-shaped base forms in Long Creek Level 8 (Wettlaufer 1960:Pl. 18 3) which dates to 2693 B.C. ± 150. Here they are associated with other side notched forms. The points are basally thinned and ground. Two specimens (Wettlaufer 1960: Pl. 18:4, 7) exhibit the low pointed basal edge common on Besant Side Notched. End scrapers are small, usually well made and have a high frequency of dorsal retouching.

The similarities in assemblages outlined above present at the 2500 B.C. time level are, I feel, insufficient for postulating a cultural tradition until more data becomes available for the 2500 B.C. - A.D. 1 interval in the Northeastern Plains. If Besant represents a discrete plains cultural tradition, earlier components of this tradition have yet to be positively identified.

Hypothesis 2B: Besant represents an intrusive cultural tradition.

In evaluation of this hypothesis I shall consider two alternatives.

a) An Eastern Woodlands edge-adapted culture adjacent to the Plains, in Middle Woodland times expanded onto the Plains or,

b) A Boreal Forest culture which expanded onto the Plains, acquiring ceramics, habitations and burial mounds from the Eastern Woodlands.

Alternative A:

Although the data is scanty from Minnesota, and largely unpublished,

there is enough available to make some meaningful comparisons.

Southwestern Minnesota.

Early Woodland ceramics are identified in an analysis by Bonney (1962, 1965) of data collected by Wilford some years ago in southwestern Minnesota:

> sherds of Class I (Black Sand Incised, Illinois and Dane Incised, Wisconsin), "thick", which is related to Marion Thick (Illinois), fabric impressed body sherds and Class VI rim sherds (Jackson Fabric Impressed, Jackson Net Impressed, and fabric impressed pottery from Wisconsin), Class V rims (Jackson cordmarked with punctate and boss decoration immediately below the lip (Bonney 1965:45).

Although identifying Early and Late Woodland and Mississippian (Cambria), Bonney considers Middle Woodland to be absent. However I suggest that Class iII (horizontal cording with exterior punctates), Class IV (undecorated vertical or diagonal corded), Class V (vertical or diagonal cording, with single or multiple row of punctates or boss, which may alternate, and simple dentate cord wrapped stick on lip), and Class VIII (undecorated vertical corded or internally punctated with simple dentate on lip) could easily be assigned to the Middle Woodland.

Class X rims (smoothed rims with horizontal rows of cord impressed lines), and some rims in Class IX have the same decorative techniques as found on Loseke ceramics. Other rim classes resemble Lake Michigan Ware. Class III rim sherds are, according to Bonney, like Wilford's Red River Aspect materials.

Unfortunately the sites (Pederson, Mountain Lake, Fox Lake, Tuttle Lake, T. Johnson), are stratigraphically mixed. They usually contain Early and Late Woodland, and Mississippian components. Since some of the ceramics are probably Middle Woodland, the sites may also contain components of this age. Mississippian projectile points in these sites, triangular unnotched--are sufficiently distinctive and therefore one may assign the other points to the Early, Middle and Late Woodland components.

Bonney's notched point types cover a varitey of forms. The illustrated specimen for Type IIa (N=4) resembles an Oxbow point. Type IIb (N=5) resembles Pelican Lake Corner Notched Type IIc (N=5) is an obtuse shouldered form with a concave base, and IId (N=11) an obtuse shouldered form with a straight base. Type IV (N=10) is a variety of barbed forms similar to Pelican Lake Corner Notched. Type III consists of a variety of stemmed forms. The specimens are insufficiently illustrated to determine whether any of the obtuse shouldered forms IId and IIc, are Besant Side Notched. Some are large and look quite like Besant; others may be arrow points (particularly IId).

Bifaces are divided into uniface and biface by Bonney. Formal variations present include asymmetric ovate, symmetric ovate and triangular convex base. End scrapers include small, well-made triangular or rectangular forms and larger forms. Dorsal retouching is fairly frequent.

In the same general area of southwestern Minnesota at Lake Shetak, Wilford excavated a number of mounds. These are characterized by:

> bundle burials in a shallow sub mound pit, associated with a few body sherds with cord-wrapped paddle markings, 2 decorated sherds with single cord impressions, and 5 arrow points, only 1 of which is triangular . . . . Shetak mound has 2 leaf shaped non stemmed points, 2 stemmed points, and 1 triangular point with side notches (Wilford 1955:133).

Howard Lake.

In illustrated lithic artifacts from the Howard Lake site in central Minnesota (Wilford 1937, 1955), which Wilford assigned to Hopewell only a few are at all similar to Besant forms.

Malmo.

Wilford's (1955) Malmo Focus in central Minnesota has some similarities to Besant. A number of points from the Malmo Mounds (Wilford 1944) which I examined correspond non metrically to Besant, although ground bases are very infrequent. Other points are small and characterized by convex bases. Three Malmo mounds have been dated (Johnson 1964). The

Anderson Mound, containing a central log covered subfloor pit with multiple secondary interments, yielded a date of 200 B.C. ± 180 (I-786) from the charred log cover. Morrison Mound No. 13 yielded a date of 690 B.C. ± 200 (I-787) from the charred over the central subfloor pit. High Island, a mound with a log covered central burial pit yielded a date of A.D. 450 ± 150 (I-788).

Malmo Mound traits also include flexed or secondary bundle burials in pits or fill, firing of the timbers, and cremation. Occasionally a small cairn will be present at the mound base and bison carcasses will be found associated. Grave goods other than village ceramics are not included.

Wilford (1955:135) suggests that Malmo ceramically is in "an intermediate spatial position between Howard Lake and Laurel wares." Wright (1967:106) concurs with the opinion. Ceramics are 10.2 per cent cord paddled and 87.8 per cent plain surfaced. Decoration consists of 33.3 per cent cord wrapped stick, 7.7 per cent dentate, 13.5 per cent punctate, 22.0 per cent incised line, 12.1 per cent boss, 0.3 per cent single cord, 8.3 per cent push-pull bands (Wilford 1955:Table 7). Vessels are conoidal.

Kathio.

Two Kathio mounds located in Western Minnesota have been dated (Johnson 1964); Crookston Mound, which yielded a modern date, and Round Mound which have a date from powdered wood of A.D. 930 ± 100. The Kathio Mound burial pattern is essentially the same as Malmo.

Kathio is characterized by cord paddled pottery (75.5 per cent). Vessels have constricted necks, well defined shoulders and globular forms. The occasional presence of shell tempered sherds is construed by Wilford to represent contact with Mississippian cultures. Decoration consists of cord wrapped stick (50.9 per cent), dentate (20.1 per cent), punctates (14.2 per cent), incised line (6.1 per cent), single cord impressed (0.3 per cent) and bosses (0.2 per cent) (Wilford 1955:Table 7).

Red River Aspect.

Two sites assigned to the Red River Aspect of western Minnesota (Wilford 1955) have been dated (Johnson 1964). The Harstad Burial Mound assigned to the Arvilla Focus yielded a date of A.D. 790 ± 120 (I-778). This linear mound contained two burial pits, one of which yielded a secondary disarticulated skeleton and associated artifacts. A shell smaple gave a second date of 1240 B.C. ± 140. The DeSpeigler site assigned to the Lake Traverse Focus (Wilford 1955:137) yielded a date of A.D. 600 ± 110 (I-799) on human bone. A second date from bark around a pottery vessel gave a date of A.D. 1300 ± 100 (I-729). The site consisted of a series of pit burials, probably under a linear mound. The burials consisted of primary burials lacking skulls and arms and secondary burials consisting of skulls and arms. Artifacts are usually associated with the latter.

Associated grave goods include bone awls, pins, arms bands, tubular beads, whistles, unilaterally barbed harpoons, antler chisels and pipes, perforated antler tines, bear tooth pendants and canid teeth necklaces; Columella beads, clam shell beads and copper artifacts.

The associated pottery is described by Wilford (1955:138):

> dentate stamping is apparently more used than cord wrapped stick impressions and cord wrapped paddle impressions are often horizontal rather than vertical. Dentate stamping may be superimposed over vertical cord-wrapped paddle markings where these extend to the rim, but punctates are used over horizontal markings. The 2 restored vessels . . . are squat with pointed bases and relatively long necks and wide mouths. Both have cord wrapped paddle markings, one horizontal and one vertical, but the necks are smoothed and decorated with oblique lines of dentate stamp.

The Red River Aspect dates from Harstad and the DeSpeigler site place it at A.D. 500-1000. The linear mound burial pattern of separate burials of various body elements is totally unlike Besant or Loseke. However the grave goods from DeSpeigler show some interesting similarities; bear tooth pendants, drilled canines, copper columella beads, pipes, antler pins, awls, tubular beads with Besant; shell disk beads,

snail shell beads, columella beads, clam shell pendants and spoons, tubular bone beads and drilled canines with Loseke. Some of these may be items indicative of trade contacts between Besant, Loseke and the Red River Aspect. The ceramics are generally quite different, although the horizontal corded wares with punctates seem to be similar to the decorative technique present on some Besant and Loseke ceramics.

Evaluation of the Malmo and Kathio dates suggests a date of ca. A.D. 1-500 for Malmo and A.D. 900-1000 for Kathio. Kathio postdates the Lake Traverse Focus ceramically. Malmo-Kathio similarities with Besant in mortuary practices are seen in secondary interments and central log-covered subfloor pits, often with associated bison skulls and carcasses. The major difference between the two in the burial system would seem to be the almost complete lack of grave goods in Malmo and Kathio and the presence of cremation in Malmo-Kathio. Besant ceramics are similar to the Malmo corded punctated wares. However, only a single example of a dentate-stamp, smooth-finished vessel occurs in Besant.

The Lake Shetek Mound burial pattern is very similar to some of the variants in the Loseke burial system. Cord impressed ceramics at Lake Shetak imply a ca. A.D. 500-1000 date for the site.

Bonney's sites show some similarities to Besant in projectile points, end scrapers and bifaces. Ceramics are similar in the cord-roughened punctated or bossed wares. However, Besant lacks the cord wrapped stick and incised line motifs and has only one example of dentate stamp ceramics. Similarities to Valley-Loseke are seen in cord-wrapped stick and cord-impressed wares.

I feel that the above date is best interpreted as follows:

(1) Malmo-Besant burial pattern similarities (burial in a log covered pit below a mound) indicate a common source for diffusion of the pattern into both phases. The few ceramic similarities are indicative of participation by both in the Middle Woodland ceramic tradition. Contact between Besant and Malmo is evident in the occasional presence of Besant Side Notched points in Malmo mounds and perhaps also the placement of bison remains in the Malmo mounds. However, I do not think these

similarities are sufficient to indicate related cultures, and Besant and Malmo should be conceptualized as equivalent in time, culturally unrelated, spatially adjacent populations, who maintained contacts.

(2) Specific similarities, if present, in projectile points between Besant and southwest Minnesota may be seen as contact. In other assemblage elements such asymmetric bifaces and dorsally finished end scrapers, the similarities to Besant probably do not represent contact, as these forms, particularly end scrapers, are present in Middle Woodland sites to the east in Wisconsin, e.g. Silver Creek (Hurley 1966).

In summary one may conceptualize the Besant Phase at A.D. 1 as representing a cultural tradition generally unrelated to those present in central and southwestern Minnesota. Such similarities as do exist may, in certain cases, represent contact between the groups, or participation in the same generalized Middle Woodland traditions. The presence of dorsally finished end scrapers, asymmetric ovate bifaces and obtuse shouldered points of specific forms suggests that these cultulral traditions may have diverged from a preceramic tradition present in the Northeast Periphery and adjacent Eastern Woodlands at, perhaps, ca. 1000-500 B.C. At present adequate data is not available for this area at this time level.

The probability that Besant represents an intrusion of peoples from the Illinois or Ohio Hopewellian areas is extremely low:

(1) The Besant lithic artifact assemblage has limited variation in formal types present within any one functional system. In Hopewellian communities there is a much wider variation in forms within the lithic functional systems. For example; at Renner (Wedel 1943:Pl. 1) large stemmed large corner notched (Snyder) and smaller corner notched (similar to Pelican Lake Corner Notched) are found associated. Discoids and end scrapers are large and generally ovate in outlines with generally dorsally unretouched surfaces. Often the scrapers are notched (Wedel 1943:Pl. 12, 14). At the Poole Village (McGregor 1958) point forms include large stemmed and corner notched forms and occasional side notched forms. Scrapers are disk shape, large oval or occasionally, small and well finished. At Steuben (Morse 1963) points are large stemmed or corner

notched (Snyder), smaller corner notched, and side notched. Scrapers may be notched, discoidal or oval in outline and bifaces tend to be triangular or ovate.

(2) Although data are generally lacking, there are no assemblages comparable to Besant in Minnesota or down the Missouri which would indicate a Hopewellian expansion to the Northern Plains if Besant was a Plains Hopewell variant.

(3) Hopewellian ceramic variation is not present in Besant.

(4) The burial mounds, although certainly Hopewellian in form and origin, lack many grave goods which one would expect if these were built by a Hopewellian population coming out of Kansas City or Illinois-Ohio. Such missing items include platform pipes, galena, mica and mortuary vessels of Hopewellian design. Grave goods held in common include, hairpins, bear tooth pendants, conch, Olivella and Dentalium shell ornaments, catlinite, obsidian, and copper.

It may be argued that Besant represents the Frontier Culture of a Middle Woodland group that is participating in the Hopewellian Interaction Sphere. If this was the case one should expect the same formal types of bifaces, projectile points, end scrapers etc. to be present.

In sum the present evidence does not support a hypothesis that Besant represents an intrusive Middle Woodland group. Contacts with the Woodlands and with the Hopewellian Interaction Sphere may, however, be seen in the ceramics and mortuary complex.

Hypothessis 2B

Alternative B:

Besant represents an intrusive Boreal Forest Culture.

In evaluating this hypothesis we shall consider only two areas--southeastern Manitoba and the northewestern Boreal Forest.

Southeastern Manitoba.

The Larter Phase in the Parkland area of Manitoba is followed by the Anderson and Nutimik phases (foci) (MacNeish 1958). The latter belongs to

the Laurel Tradition (Wright 1967). These two phases are considered by Wright to be only one phase relatively late in the Laurel Tradition:

> the abundant use of cording, as a method of surface treatment and as a decorative technique, would suggest that the complex is possibly transitional from Middle Woodland to Late Woodland. Such a transition gains support from the incidence of boss-producing exterior punctates and the obliques or verticals above horizontal motif, although the samples are too small to be demonstrative (Wright 1967:107).

Tail Race Bay (Mayer-Oakes 1968), located further north in Manitoba is placed by Wright early in the Laurel Tradition.

Prior to considering the relationships between Besant and Anderson-Nutimik, the relationships between Larter and Anderson-Nutimik will be examined.

MacNeish has suggested that the change from a bison hunting economy in Larter to a more generalized hunting-gathering-fishing orientation in Anderson is a result of a shift from grasslands to Parkland at this time. MacNeish speculates on the relationships of the phases as follows:

> Whether this culture (Anderson) represents the addition of pottery to a Larter-like complex, or whether it represents a new group who moved in from Minnesota is at present unknown . . . . The general similarity of these materials to those east of Manitoba and the almost complete absence of them north, west, (such as the contemporous Besant Focus of Saskatchewan), or south of Manitoba, suggests that influences or movements of peoples must have come out of the Eastern Woodlands (MacNeish 1958:78).

In the projectile system the only continuity is in Anderson Corner Notched which is present only in the latest Larter component--Lockport 12. Forms mutually exclusive to the phases are Larter Tanged, Parkdale Eared, Winnipeg Ovoid, Sturgeon Triangular and McKean in Larter; Lockport Stemmed in Anderson; and Whiteshell Side Notched in Nutimik.

In bifaces only the ovoid forms show continuity between the phases--Larter (N=24), Anderson (N=3), Nutimik (N=1). Larter has, in addition, bifacial choppers (N=4), bifacial borers (N=2), oblong bifaces (N=2),

semilunar bifaces (N=2), bifacial disks (N=3) and triangular bifaces (N=5). Nutimik has one small half-moon biface.

End scraper continuity is seen in large plano-convex end scrapers in Larter (N=2) and Nutimik (N=1), and prismatic end scrapers in Larter (N=1) and Nutimik (N=8). Forms present in Larter only are ovoid plano-convex (N=10) flake end scrapers (N=14), notched end scrapers (N=3) and small disk end scrapers (N=5). Oblong plano-convex end scrapers are present only in Anderson (N=2) and Nutimik (N=8). Prismatic blade (N=3) and triangular end scrapers (N=2) are present only in Nutimik. Flake side scrapers are present in all three phases, however pointed flake side scrapers are present only in Larter (N=6).

There is then, relatively little continuity between Larter and Anderson-Nutimik in the artifact assemblage. Although one might argue that many of the tools present in Larter and confined to the Larter site represent task-specific tool kits related to a bison hunting adaptation. I believe that if the two are related, continuity in formal types should be observable even though the samples are very small.

On the basis of the above one may suggest that Larter and Anderson-Nutimik represent separate cultural traditions. The Larter Phase population probably was displaced into southwestern Manitoba by an environmental shift which resulted in the depression of the Boreal Forest-Parkland edge. This shift probably correlates with the onset of the Sub-Atlantic Climatic Period (p. 4). The Parkland area was subsequently reoccupied by generalized hunter-gatherer-fishers belonging to the Laurel Tradition who moved in from the north and/or east; their effect, if any, on the Larter population is not determinable at this time.

Comparisons of lithic assemblages show few similarities between Besant and Anderson-Nutimik. Some Anderson Corner Notched and Whiteshell Side Notched may be Besant. However, the classic Besant point attributes of basal edge, base configuration and thinned ground bases seem to be absent. Anderson and Whiteshell points seem more similar to Laurel forms illustrated by Wright (1967). Lockport Stemmed, an Anderson type, is not found in Besant, and the Besant unnotched point type is absent in Anderson-Nutimik.

Asymmetric bifaces are very rare in Anderson-Nutimik, being represented by only two specimens in Nutimik. These are closer to Avonlea types in form than to Besant. Symmetric ovates seem to be the characteristic type in Anderson-Nutimik, this contrasting with asymmetric ovates in Besant. Similarities in the end scrapers are seen in the oblong plano-convex, prismatic and triangular forms. The latter are very finely retouched and compare very favorably with Besant forms. There is, however, very little similarity in ceramics.

I interpret the few similarities in assemblage between Besant and Anderson-Nutimik, i.e. particular points and dorsally finished end scrapers, as the result of contact of Besant with the Anderson-Nutimik populations.

At the United Church site (MacNeish and Capes 1958) in southwestern Manitoba, Avery corded wares (which I have assigned to the Besant Phase), presumably associate with ceramics which MacNeish and Capes call Laurel Plain. (Smooth, usually undecorated vessels. Decoration present consisted of exterior nodes, linear punctates and dentate stamping.) Although some of the undecorated sherds may not be Laurel, the presence of the Laurel decorative motifs, associated with Besant ceramics may be evidence of contact between the Besant Phase populations resident in the southwestern Manitoba grasslands and the adjacent Anderson-Nutimik populations in the Parklands of Manitoba.

Boreal Forest

In the Fishermans Lake sequence near Fort Liard, Northwest Territories (Miller 1968), relevant complexes are Julian (2500-1500 B.C.), Pointed Mountain (1500-1000 B.C.), Fish Lake (1000-700 B.C.), JcRw-8 1W (700-300 B.C.), MacKenzie (300 B.C.-A.D. 500) and Spence River (A.D. 500-1800). Julian, Pointed Mountain and Fish Lake are assigned to the Northwest Microblade Tradition which is represented by two distinct technologies--"manufacture of small primatic blades from a variety of polyhedral cores and the manufacture of a wide range of crude tool types from large flakes and cores" (Miller 1968:413). This technology is seen as an initial forest adaptation which is gradually replaced by more slutable tools in later times. JcRw-8 and MacKenzie are transitional to the Denetsero Tradition represented in Spence River. Millar (1968:348) sees cultural continuity

from Julian to the Historic Period. This continuity he assigns to the Athabaskans.

Large broad side notched and corner notched points appear in both Julian (N=2) and Pointed Mountain (N=3). Unnotched convex lateral edge straight base points are present in Pointed Mountain. Two Oxbow points are present in Fishermans Lake. In JcRw-8, narrow side notched points (N=2) characterized by obtuse shoulders, fine flaking and straight to moderately convex retouched bases which Millar compares to Whiteshell Side Notched and Hanna, and unnotched convex lateral edge convex base points appear. Unnotched convex lateral edge convex base (N=2) or straight base (N=1), broad side notched (N=1), narrow side notched (N=1), corner notched (N=1), plus stemmed and lanceolate point forms are present in MacKenzie. Spence River contains broad side notched (N=1), narrow side notched (N=4), corner notched (N=2), and both unnotched types (N=5). Small side notched arrow points are also present in Spence River.

Ovate symmetric bifaces occur in all phases, straight based ovates in JcRw-8 and MacKenzie and asymmetric ovates in MacKenzie and Spence River. Small, well-made, dorasily finished ovate to traingulaoid, end scrapers first appear in Pointed Mountain and continue through the sequence.

Elsewhere in the Boreal Forest, points typed as Besant or Besant-lide points are found in a variety of complexes. The Lockhart River complex contains, in addition to Besant points (MacNeish 1951:Pl. III 2nd row 1, 2, 3; 3rd row 1, 2), broad side notched, stemmed points, unnotched convex lateral edge convex base points, asymmetric ovates, bifaces and dorsally retouched end scrapers.

In the southwest Yukon, MacNeish (1964) identifies Besant points in Gladstone (N=4) and Taye Lake (N=2). Taye Lake has radiocarbon dates of 1520 B.C. ± 300, (W-1123), 1770 B.C. ± 300 (W-1122) and 2780 B.C. ± 320 (W-1125) and Gladstone a date of 1300 B.C. (Millar 1968). Some are probably Oxbow--not Besant (MacNeish 1964:Fig. 87 5). Lockhart River points present in both phases also resemble Besant (MacNeish 1964:Fig. 87:8). Most of the latter also have basal grinding.

Since there is no evidence of a microblade core technology in Besant,

if Besant is derived from a northern tradition, its initial appearance in the Northern Plains postdates the loss of this technology in the north.

Comparisons of Besant to the MacKenzie complex (post microblade) show similarities in the side notched and unnotched convex lateral edge straight base points, small dorsally retouched rectangular, ovate, and triangular end scrapers and ovate symmetric and ovate asymmetric bifaces. Besant, however, lacks the wide range of laneolate points present in MacKenzie suggesting that the two are unrelated. MacKenzie could be, but probably is not, a source area for the introduction of the Besant point, end scrapers, and bifaces into an indigenous plains tradition.

In summary, comparisons have been made to the Western Boreal Forest and the Eastern Woodlands in a search for a possible external origin for the Besant Phase. The present evidence is by no means unequivocal and the possibility must remain open that Besant could have come from something like the Lockhart River complex or an edge adapted Eastern Woodlands Tradition. However, I feel that the present evidence favors a hypothesis which considers the Besant Phase to be representative of a Plains Cultural tradition, separate both from the TUNAXA and the Plains Horticultural traditions which had been present on the Northern Plains from at least since about 1000-500 B.C. in the area east of the Missouri in North Dakota and northern South Dakota. I propose to name the tradition, of which Besant is a serial phase, NAPIKWAN. Relationships of Besant to Avonlea and other phases are considered in following sections.

SECTION 3: AVONLEA PHASE

The Avonlea Phase presents a difficult problem of interpretation since most of the data is from kill sites. Briefly the Avonlea Phase is characterized as follows: (Tables 32, 35, 37, 38, 41)

(1) Low frequency of unnotched points. Presence of arrow points of two trial types; Head-Smashed-In Corner Notched and Timber Ridge Side Notched. Although the former is the earlier type, the latter type is dominant at all times.

(2) Asymmetric bifaces which tend through time from ovate to lanceo-

late. Presence of a diamond-shaped biface. Symmetric ovates may have a higher frequency in earlier components.

(3) Pointed unifacial flakes; bifacial and unifacial cobble, core and flake choppers.

(4) Excavated basin-shaped, rock-filled hearths.

(5) Distinctive lithics in the northern Montana-Saskatchewan Basin area.

(6) Fabric or net impressed ceramics with punctate designs.

(7) A possible pit burial pattern characterized by flexed or extended primary inhumations. Associated grave goods include projectile points, tubular bone beads and shell disk beads.

Since Avonlea seems to be the first with the bow and arrow on the Northern Plains one must consider from whence and when came this technology in looking for its possible extra plains origin for Avonlea.

In the southwest, arrow points first appear as local artifacts in Basketmaker III (Willey 1966). In the Great Basin Rose Spring Corner Notched and Eastgate Expanding Stem (arrow) replace Elko Eared (atlatl) points during the period from A.D. 400-600 (O'Connell and Ambro 1968; Clewlow 1967). Farther north in the Columbia Plateau, Columbia Valley Corner Notched (arrow) appears ca. A.D. 600 (Mallory pers. comm.)

In the Birch Creek Valley (Swanson et al. 1964) the first arrow points seem to appear in the Blue Dome Phase (A.D. 400-1200). These are basal and corner notched forms. Blue Dome Side Notched which resemble Avonlea appear late in the phase at about A.D. 800.

In interior British Columbia, at the Lochnore-Nesikep Creek locality, arrow points appear in the Late Period A.D. 1-1800 (Sanger 1968:38). Sanger's Late Middle Period contains a variety of leaf-shape, stemmed corner notched and basal notched points (Sanger 1966:Pl. 5). One point from the Late Middle Period (Sanger 1967:Fig. 5) could be an arrow point. Presumably the main forms in the Early Late Period prior to A.D. 1000 when the side notched point becomes characteristic, are stemmed and corner notched varieties. No dating control brackets this transition at Lochnore-Nesikep Creek.

In the Fraser Canyon stemmed arrow points are said to appear in the Baldwin Phase 1000-350 B.C.; Skamel, 350 B.D.-A.D. 200 and Emery (Borden 1968) is said to contain corner notched points.

In the Boreal Forest, arrow points do not appear until the Spence River complex, ca. A.D. 500, at Fishermans Lake (Millar 1968). In the Arctic, the bow and arrow is present in the Denbigh Flint Complex--4000-2500 B.C. (Giddings 1964:232). The end blades which were hafted into organic arrow points are bipoint lanceolate or incipient stemmed in form. The Old Whaling Culture projectile point forms, (ca. 1800 B.C.), characterized by convex lateral edges, obtuse shoulders, shallow notched and convex to straight, usually ground bases (Giddings 1962:Fig. 7), exhibit a bimodal size distribution which may represent both arrow and atlatl. In Norton, stemmed projectile points (ca. 500 B.C.), exhibit a similar bimodal distribution (Giddings 1964:161-165, Pl. 48, 49, 50).

The evidence presented above indicates that notched arrow points first appear in the western Arctic in Old Whaling at ca. 1800 B.C. Their first appearance to the south in the Fraser Canyon sequence is presumably in the Baldwin Phase (1000 B.C.-350 B.C.) and then upriver in the interior at Lochnore-Nesikep Creek between 1 and A.D. 1000. Farther south, Columbia Valley Corner Notched and related forms appear in the Plateau and Great Basin at ca. A.D. 400.

Since Avonlea predates Columbia Valley Corner Notched and the arrow points in the Boreal Forest, one must look to British Columbia or to an unknown area of the Boreal Forest, for the cultural origins of Avonlea if it is characterized in these areas by the plains types--Head-Smashed-In Corner Notched and Timber Ridge Side Notched. No specimens resembling these have been reported on in the Cordilleran west. Consequently if Avonlea represents an intrusive cultural tradition, then it must have left its home prior to the introduction of the bow and arrow, and we must therefore look at complexes characterized by atlatl points in these areas.

Earlier or coeval atlatl forms tend to be very similar to the arrow forms in indigenous cultural traditions e.g. Besant, Norton and Old Whaling. Head-Smashed-In Corner Notched, since it is the earlier Avonlea arrow point type should therefore be formally representative of the

Avonlea atlatl forms, which will be a Pelican Lake Corner Notched variant.

Although the vast area of the British Columbia Interior is relatively unknown, an entirely different cultural adaptation is manifest in such localities as Lochnore-Nesikep Creek or the Arrow Lakes. Collections from the pit houses in Shuswap Lake area, only some 300 miles away from the plains, have similar projectile point variations to those to the west. Very few Pelican Lake Corner Notched forms are present (K. Fladmark, pers. comm.). The Boreal Forest east of Fishermans Lake is rather poorly known. If, however, the MacKenzie complex (Millar 1968) is more or less representative across this area few similarities can be seen to Avonlea.

In sum, I feel that the present evidence does not support a hypothesis that Avonlea moved into the Plains from the Boreal Forest and consequently there can be no support here for the Kehoes' (1968:30) statement:

> we believe the historically-described ritualistic communal drives emerged from an already-specialized drive complex to the north of the Northwestern Plains, and that it was brought to our region by the hunting groups that also introduced the bow and arrow (with Avonlea type point).

If Avonlea does not represent an intrusive cultural tradition in the Northern Plains then it should be related to either the Pelican Lake Phase of the TUNAXA cultural tradition, or the Besant Phase of the NAPIKWAN cultural tradition.

Similarities between Avonlea and Pelican Lake are seen in:

(1) The Head-Smashed-In Corner Notched point of Avonlea corresponds very closely in nonmetric attributes to Pelican Lake Mortlach Subphase variety.

(2) Many lithics utilized for Head-Smashed-In points are the same as for Pelican Lake Corner Notched in the earlier Mortlach Subphase in southern Alberta. The source area of most of these lithics in in the Alberta Rockies.

(3) The high frequency of symmetric ovate bifaces in earlier Avonlea components is comparable to the frequency of these forms in the Mortlach Subphase.

(4) The occasional presence of Pelican Lake Corner Notched atlatl points in basal Avonlea components.

(5) The presence of pointed unifacial flakes, bifacial choppers, primary pit burials and excavated rock-filled hearths in both phases.

Similarities between Avonlea and the Besant Phase, which occupy a similar segment of time in the Northwestern Plains and which are not characteristic of the Pelican Lake Phase are seen in:

(1) The bow and arrow technology, present in Avonlea and Besant, plus the occasional presence of Timber Ridge Side Notched points in Besant Phase components and Besant Side Notched and Samantha Side Notched in Avonlea components.

(2) Some of the formal attributes of the Timber Ridge Side Notched point are similar to Besant and Samantha Side Notched points.

(3) An unnotched Avonlea point type--convex lateral edge straight base is the same as the characteristic unnotched Besant type. They are rare in both Besant and Avonlea. They are, however, also infrequent in the Pelican Lake-Mortlach Subphase.

(4) Asymmetric ovate bifaces are characteristic forms in both Besant and Avonlea.

(5) Avonlea and Besant lithic systems both generally lack obsidian and the red and grey siltstones which are common in certain Pelican Lake Subphases, but absent in the Mortlach Subphase.

(6) Conoidal pottery with punctated bossed decorations is characteristic of both phases.

Similarities between Pelican Lake and Avonlea not found in Besant are:

(1) Barbed corner notched point forms in any frequency.

(2) Excavated rock-filled basin-shaped hearths.

(3) Pointed unifacial flakes, bifacial choppers and certain lithic types.

(4) Primary pit burial pattern.

Differences between Avonlea, Besant and Pelican Lake are seen in:

(1) Specific arrow point forms.

(2) High frequency of asymmetric lanceolate bifaces. Many other asymmetric forms are symmetric in form in Besant and Pelican Lake. Presence of a distinctive symmetric form in Avonlea--the diamond-shaped biface.

(3) A distinctive lithic suite not found in either of the other two phases.

(4) Fabric impressed pottery.

Evidence indicates that Besant and Avonlea are coeval in the Northwestern Plains and I feel that the similarities listed above between Pelican Lake and Avonlea are indicative of cultural continuity between the two phases, and consequently Avonlea should be placed as a sequent phase in the TUNAXA cultural tradition. The similarities between Besant and Avonela, may be the result of contact between the two cultures.

It is evident, however, that Avonlea differs considerably from both the Besant and Pelican Lake Phases. These differences may in part be due to the influence brought upon the Avonlea population by Besant Phase populations and also the development of new formal artifact systems resulting from contact with groups adjacent tothe area occupied by Avonlea or through internally induced culture change.

Since the gradual transition from atlatl to bow and arrow is not represented in sampled Avonlea sites in the Northern Plains as it is in the Besant Phase, I suggest that, because of some of the lithic sources in the early Avonlea components at Head-Smashed-In, this technological change occurred in the Parkland-Rocky Mountains Trench area of Alberta-British Columbia. The presence of serrated lateral edges in Avonlea, and the association of small stemmed arrow points in the earliest Avonlea component at Head-Smashed-In may be indicative of contact between the Avonlea Phase during this period of change and cultures resident to the west in British Columbia, from which direction bow and arrow technology was probably introduced.

Whether the distribution of Avonlea can be explained as a physical expansion by a population from the Saksatchewan Basin or the diffusion of the new point type to related TUNAXA populations cannot be demonstrated

at this time. I prefer to think that the point types originated in the Saskatchewan Basin and diffused across the Missouri Basin to the Powder River-Black Hills area by ca. A.D. 400-500. In certain areas Avonlea does not seem important. In other areas it is absent.

Contact with other phases may be seen in the presence of occasional Avonlea points in Parker and Patten Creek; and perhaps asymmetric ovate, asymmetric bipoint ovate and asymmteric lanceolate bifaces in Loseke. Avonlea points and occasional asymmetric lanceolates are represented in the Todd Phase. The presence of occasional Avonlea points and asymmetric lanceolates in initial Middle Missouri components is also viewed as representing cultural contact rather than any "genetic" relationship (Husted 1968).

When the Avonlea Phase terminated across the area is not clear. In the Saskatchewan Basin, the evidence suggests replacement by Besant at ca. A.D. 700, with the latter developing into the Old Women's Phase as represented at the Old Women's Buffalo Jump. At Head-Smashed-In, Samantha points appear in terminal Avonlea components. Because of highly compressed stratigraphy the relationship of Avonlea to the Old Women's Phase is unclear at this level. However, there does seem to be a rather sharp break in cultural continuity between the two phases.

In northern and southern Montana present data suggest that Avonlea continues somewhat later than Besant. In southern Montana Avonlea may be replaced by a phase characterized by tri-notched points. North of the Missouri the evidence suggests the presence of a phase like the Old Women's.

In the Belle Fourche-Powder River-Black Hills area the situation is unclear, because of the absence of radiocarbon dates and clear-cut multiple component sites. The Avonlea phase may represent an antecedent phase to the Keyhole Phase (presently known only for the Keyhole Reservoir) or may coexist in different areas. In other areas such as the Black Hills, Avonlea may persist as a discrete phase, followed in the Black Hills by a phase characterized by tri-notched points and Upper Republican style ceramics (Wheeler 1958). In the Belle Fourche-Powder River area present evidence would indicate Avonlea or Keyhole to be replaced by a phase characterized by tri-notched points (Wheeler 1958).

Avonlea seems to be absent as a discrete phase in the Besant Phase of the Middle Missouri. Besant, or a derivative phase, is probably terminated ca. A.D. 1200 by the Fort Yates Phase of the Middle Missouri tradition.

In Manitoba the picture is even less clear. Although Timber Ridge Side Notched points are present at Avery, their associations are unknown. Besant may have continued as a discrete phase until ca. A.D. 1000. The occasional Avonlea occurs at Lockport (Joyce pers. comm.), and may be interpreted as evidence of contact with the resident Parkland populace. In southwestern Manitoba the resident phase, whether Avonlea or Besant, is replaced ca. A.D. 1000 by Manitoba Phase materials (MacNeish 1958).

In the southern Alberta montagne, the Avonlea Phase is followed by the Old Women's at ca. A.D. 800. Access to the Avon quarries in Montana is indicated by the occasional presence of Avon chert at the Avonlea components at Head-Smashed-In.

One final point to consider is the Kehoes' postulate that Avonlea is "the earliest that we can accept as evidence for the complex, ritualized, planned bison drives of the Late Prehistoric Plains" (Kehoe and Kehoe 1968: 28). They consider that Avonlea drives are communal, and all previous drives are "simple" i.e., not communal. They are instead, fortuitous events involving the driving of stray bison, over a suitable precipice or into a natural trap.

The Kehoes argue (1968:28-9) that "earlier bison kills known to us from the Northwestern Plains do not involve the quantity of animals to be expected from impounded herds." Now this is a rather poor criterion, since the historical literature tells of many instances when only a small herd or part of the herd was brought into the pound (MacGregor 1966:69). One cannot demonstrate whether a drive was complex or simple on the basis of the number of bones present.

The Kehoes also consider that evidence of ritualism and planning for a drive must be present, and that the site must be used repetitively. There are innumerable sites where corrals would not have been necessary. Also since corrals are of wood constructions, they would not necessarily

be preserved. Stone cairns marking the drive lanes need not be present, since in historic times the aborigines often used brush or dung piles as markers and blinds. Also mutliple use of the same site is not necessary. Historical literature refers to the single use of pounding sites which involved drive lanes, communal driving, corrals and presumably ritualism. The presence of ritual activities, "four day shamanistic bundle ceremony accompanying driving and scouting," in prehistoric drives is going to be very rarely, if ever, demonstrated.

Without considering Early Prehistoric sites such as Bonfire Shelter, Olson-Chubbock, or Fletcher, I feel there is sufficient evidence in the Middle Prehistoric on which to postulate the presence of complex ritualized communal drives. Corral posts are known from Keaster, post molds from Malta and 24HL101, and stone drive lanes from Malta. All are Late Middle Prehistoric Kills. Also, are we to believe that the two major buffalo jumps excavated in southern Alberta--Head-Smashed-In and Old Women's--did not become communal until the Late Prehistoric? Some 15 feet of earlier Middle Prehistoric deposits, date back at Head-Smashed-In to 3700 B.C. Surely this is evidence of the repetive use of a complex ritualized communal bison drive.

In summary, I find no evidence to support the Kehoes' speculations concerning the origin of Avonlea and complex, ritualized communal bison drives. Their thesis is far too speculative and misrepresents the facts. It projects a vision of peoples, with point types and language (Anthabascan) in hand, magically appearing out of the Boreal Forest which was in fact poor in bison (Wilson pers. comm.) and not particularly conducive to communal driving.

SECTION 4: EARLY PLAINS HORTICULTURAL PHASES

Three phases--Valley, Loseke and Keith-- are considered in this section. Sterns Creek (Champ 1946; Wedel 1961), while part of the Plains Woodland complex, is late in time and not considered in this study. Before considering their origins and relationships, I shall briefly summarize and compare the phases.

The Valley Phase is characterized by the following; a low frequency

of unnotched points of limited variety, Pelican Lake and Besant Side Notched atlatl points, symmetric and symmetric ovate bifaces, irregular flake butt and T-butt drills, ovoid to ellyptical dorsally unretouched end scrapers, conoidal cord roughened ceramics with bossed or punctated designs on the rim and cord wrapped stick on the lip or rim, habitation structures, cache pits, surface hearths, a generalized subsistence base probably including corn horticulture, and a burial pattern characterized by secondary pit or mound interments with a few accompanying grave goods.

The sequent Loseke Creek Phase differs from Valley primarily in the addition of cord impressed ceramic design motifs and changes in vessel form to subconoidal to globular, the frequent presence of side notched points in addition to and replacing Besant and Pelican Lake points, pentagonal and triangular drills, a high frequency of dorsally retouched small end scrapers, asymmetric lanceolate bifaces, a more elaborate and varied mound burial pattern and a more stabliized horticultural subsistence base--although hunting is still important. Loseke also contains excavated basin-shaped earth-filled hearths which are absent in Valley.

Continuity between the two phases is seen in such systems as point types (Pelican Lake and Besant), cord roughened bossed or punctated ceramics, habitations, and burial pattern. Consequently they may be conceptualized as sequent phases of the same cultural tradition.

Keith is characterized by a low frequency of unnotched points, altatl points of the Pelican Lake and Snyder-like type, Scallorn, Ruby Corner Notched and occasionally Parker Corner Notched arrow points, absence of bifaces with modified hafting elements, symmetric and asymmetric ovate bifaces, T-butt and irregular flake butt drills; presence of small dorsally finished end scrapers, cord marked calcite and sand tempered undecorated pottery, habitation structures, excavated basin-shaped earth-filled and surface hearths, cache pits; a generalized hunting-gathering-horticultural base, and a burial system characterized by multiple secondary pit and ossuary interments with considerable quantities of associated grave goods.

Significant differences between Valley-Loseke and Keith are: The lack in Valley-Loseke of convex lateral edge straight or convex base unnotched

forms; the presence of Scallorn, Ruby Corner Notched, Parker and Snyder in Keith; of Besant in Valley-Loseke and of side notched in Loseke; absence in Keith of pentagonal and triangular drills, pointed unifaces, domed side scrapers, dorsally finished rectangular side scrapers; the lack (except in one instance) of punctated pottery in Keith and the lack of cord impressed, cord wrapped rod and other motifs, and subconoidal to globular pots with constricted necks in Keith; and the difference in burial patterns (mound in Valley-Loseke and ossuary in Keith).

These differences may be taken to indicate that these phases--Valley-Loseke and Keith--represent separate, spatially adjacent cultural traditions. The radiocarbon dates and other data indicate that they occupy the same temporal interval.

Examples of contact between the two phases may be seen in the occurrence of a straight lateral edge convex base unnotched point in Loseke and Scallorn points in Valley; the single occurrence of calcite tempered sherds in Valley, and possibly the calcite-grit tempered rim sherd in Loseke and possible dorsally finished end scrapers and asymmetric bifaces in Keith.

Specific grave items held in common between Loseke and Keith include: Olivella, conch, shell disk beads, perforated canines, shell pendants, perforated gastropod beads, and plain tubular bone beads. The 25KX207 burial assigned to Loseke contained Keith burial items such as shell bear claw pendants, crescentic shell gorgets and dentalium. Annular and spiral incised beads are present only in Keith. Valley, in contrast, lacks all the above grave goods.

Similarities between the two phases are also seen in habitation structures, cache pits, a horticultural subsistence base, and a secondary burial pattern which in both cases may have been imposed over an earlier primary pit burial pattern.

In considering the origins of these two cultures I shall consider two alternatives: (1) Keith and Valley-Loseke represent intrusive cultures from the Eastern Woodlands during Middle Woodland times, or (2) Keith and Valley-Loseke represent indigenous plains cultural traditions which acquire

ceramics habitation structures and possibly, horticulture, from the Eastern Woodlands.

Hypothesis 1

Wedel (1961:92) regards them as "peripheral manifestations of peoples more abundantly represented in the Eastern Woodland" and (284), in reference to ceramics states that they were "introduced into the trans-Missouri Plains from the east by peoples possessing a Woodland Culture." Wedel does not, however, try to distinguish whether they are indigenous or intrusive.

Jennings (1968:229) states "by about the time of Christ, the Woodland had diffused into the quite different world of the Plains" and (234) "whether the spread of the Woodland and its pottery and the beginnings of horticulture over the Plains are to be seen as representing increasing population pressure in the East or whether a climatic cycle more favorable to gardening was beginning connot yet be known" and (239) in reference to the Plains, "although the Woodland base blended with late Mississippian increments, the entire region should be viewed, as stated earlier, as derivative almost entirely from the Eastern Woodland."

Willey (1966:317) considers the pottery to be "clearly derived from the Eastern Woodland area . . . it is reasonable to assume that maize agriculture was associated with the first appearance of the Woodland tradition on the Plains, although the evidence is by no means uniform and conclusive."

To determine whether the Plains Woodland Tradition (Willey 1966), which I propose be renamed the Plains Horticultural Tradition, represents the intrusion of groups from the Eastern Woodlands, comparisons may be made to the adjacent Woodland areas of Iowa and Missouri, and Kansas City Hopewell. McKussik (1964:84) indicates that the earliest Woodland in western Iowa is Middle Woodland (A.D. 1- A.D. 500). A similar situation may obtain in northwestern Missouri.

The rare occurrence of Hopewellian ceramics or complex Hopewellian decorative motifs in Valley or Keith, and the general lack of Hopewellian items in burials in Valley or Keith (the Snyder-like points from Woodruff are an example of a complex form, probably of Hopewellian derivation) indicates relatively little contact with, or participation by, these Plains

groups, in the Hopewellian Interaction Sphere, in the sense that eastern trade goods or replicas thereof are not being used or interred with burials in pits or mounds.

Little relationship is observable in the lithic tool assemblage between Valley, Keith and Kansas City Hopewell. If the phases are intrusive, then they may represent a Middle Woodland group which moved westward across Iowa-Missouri from the Mississippi Valley rather than up the Missouri and its western tributaries. If one compares the Plains assemblages to forest adapted Middle Woodland populations, for example the Poole site, very few similarities in the lithic artifact systems can be seen.

Hypothesis 2

Keith and Valley-Loseke represent transformed indigenous Plains Cultural Traditions.

Since no regional Pelican Lake Phase components are known in the immediate Valley and Keith Phase areas, comparison must be made more generally.

Similarities between Pelican Lake and Valley-Loseke are seen in:

(1) Convex lateral edge convex base unnotched points.

(2) Pelican Lake Corner Notched atlatl points.

(3) Obtuse shouldered bifaces found in the Glendo Subphase and the Loseke Creek Phase.

(4) High frequency of ovate symmetric bifaces.

(5) T-butt and irregular flake butt drills in Pelican Lake and Valley.

(6) Irregular flake butt and ovate perforators.

(7) A high frequency of dorsally unfinished end scrapers in Valley and Pelican Lake and a high frequency of dorsally finished end scrapers in the Badger Subphase and Loseke.

(8) Pointed unifaces, bifacial choppers, domed side scrapers in Pelican Lake and Loseke.

(9) Excavated basin-shaped earth-filled hearths in Pelican Lake and Loseke.

(10) Possibly earlier primary pit burial pattern in Valley which is similar to that of the Glendo Subphase.

Differences, between Valley-Loseke and Pelican Lake, not necessarily the result of items accompanying the diffusion of horticulture and other complexes into the area are:

(1) Presence of convex lateral edge straight base unnotched points only in Valley-Loseke.

(2) General absence of straight lateral edge convex base unnotched points in Valley-Loseke.

(3) Absence of a variety of bifaces with modified hafting elements in Valley-Loseke.

(4) Presence of a high frequency of asymmetric biface forms in Valley-Loseke.

(5) Absence of basin-shaped rock-filled hearths in Valley-Loseke.

(6) General absence of rectangular bifaces in Pelican Lake.

(7) Presence of pentagonal and T-butt drills in Loseke.

As discussed elsewhere the exclusive presence of a number of items in Valley-Loseke may be the result of diffusion from the Besant Phase.

Similarities between Pelican Lake and Keith are:

(1) Straight lateral edge-convex base and convex lateral edge convex base unnotched points.

(2) Pelican Lake Corner Notched.

(3) Symmetric ovate bifaces, T-butt and irregular flake butt drills.

(4) High frequency of dorsally finished end scrapers as compared to the Badger Subphase.

(5) Presence of excavated earth-filled hearths.

(6) Possible presence of an earlier primary pit burial pattern in Keith which is similar to that of the Glendo Subphase.

Differences between Pelican Lake and Keith which are not necesarily accountable by diffusion of the corn horticultural and other complexes.

(1) Absence of bifaces with modified hafting elements in Keith.

(2) Presence in considerable frequencies of asymmetric ovate bifaces in Keith.

(3) Absence of pointed unifaces, domed side scrapers, bifacial choppers and other unifacial tools in Keith.

(4) Absence of excavated basin-shaped rock-filled hearths in Keith.

The numerous similarities are probably indicative of cultural continuity between the Pelican Lake Phase of the TUNAXA cultural tradition and the Plains Horticultural Traditions as represented in Keith and Valley. Differences in the lithic artifact systems in Valley-Loseke and Keith are indicative of other contacts. The introduciton of corn horticulture and the associated technology--chipped celts, scapula hoes, ceramics, habitation structures and cache pits--from the Eastern Woodland resulted in changes to core economic systems of such a magnitude that a new cultural adaptation was effected. Nomadic hunting-gathering cultures changed to semi-sedentary hunting-gathering-horticultural cultures. Probably accompanying the horticultural complex were new concepts associated with the interment of the dead, resulting in a change from a primary to a secondary pit burial system which in Valley became associated with a mounded earth superstructure and in Keith, at some unknown time, developed into ossuary basins. The change in core systems was of such a magnitude that we may consider the Keith and Valley-Loseke phases representative of locally adapted cultures (cultural traditions) belonging to a new subsistence tradition--the Plains Horticultural Tradition.

SECTION 5: TODD PHASE

The Todd Phase of the Big Horn-Shoshone Basin may be characterized as follows:

(1) High frequency of unnotched points.

(2) Presence of Columbia Valley Corner Notched and Ruby Corner Notched arrow points. Avonlea (Head-Smashed-In and Timber Ridge) and side notched forms appear in late components.

(3) Characteristic bifaces include symmetric ovate, ovoid, asymmetric ovate, triangular straight base, and rectanguloid.

(4) Basally notched barbed butt drill.

(5) Absence of dorsally finished end scrapers.

(6) Bifacial choppers, chi-thos, unifacial choppers and notched pebbles.

(7) Excavated rock-filled hearths, stone platform hearths and stone-edged surface hearths.

Continuity between the Spring Creek Subphase and Todd Phase may be seen in such systems as the unnotched point frequency and forms, the occasional presence of Pelican Lake Corner Notched atlatl points in Todd Phase components, high frequency of symmetric ovate bifaces, presence of asymmetric ovates and Duncan biface in Todd, irregular flake butt drills and excavated basin-shaped rock-filled hearths in Todd.

Aside from certain projectile points types, differences between the two phases are seen in the infrequency of straight based ovates in Todd, high frequency of triangular, rectangular, symmetric lanceolate and ovoid bifaces in Todd, absence of T-butt drills, pointed unifacial stone edged surface hearths and very regular stone platform hearths in Todd and absence of notched pebbles, notched butt drills, chi-thos, unifacial flake choppers in Spring Creek.

If Todd represents a sequent phase in the local TUNAXA cultural tradition we should expect such items as T-butt drills, pointed unifacial flakes, pointed unifaces and domed side scrapers to continue, as they were functional in the TUNAXA cultural tradition for over two millenia, and continue in the spatially adjacent Patten Creek Phase which is considered a sequent TUNAXA phase.

Since these items are absent, I believe that the change exhibited in the preserved cultural systems is indicative either of intense acculturation of the indigenous cultural tradition as a result of pressures being applied to it by cultures to the south and west, or of the physical dominance of the indigenous population by a group from the west or south. The Todd Phase, whether it represents an intrusive cultural tradition or an acculturated group of the TUNAXA tradition, is a distinctly different

cultural tradition whose primary relationships seem to lie towards the Great Basin and mountainous west. Contact with the adjacent Avonlea Phase is seen in the introduction of the Timber Ridge Side Notched point into late Todd Phase components.

SECTION 6: PATTEN CREEK AND KEYHOLE PHASES

The Patten Creek Phase, which occupies the Northern Platte area of the earlier Glendo Subphase, may be briefly characterized as follows:

(1) Presence of variety of unnotched points. Scallorn is the characteristic arrow point type.

(2) Symmetric ovate bifaces, with straight or convex bases.

(3) Presence of pointed unifacial flakes, pointed unifaces, domed side scrapers and rectangular dorsally finished side scrapers.

(4) Excavated rock-filled basin or bucket-shaped hearths.

(5) Primary pit burials with associated grave goods.

I suggest that the following evidence indicates cultural continuity from Glendo to Patten Creek: pointed unifacial flakes, pointed unifaces, domed side scrapers, biface types, hearth types and burial system.

The Patten Creek may be considered a sequent phase of the TUNAXA cultural tradition. The major difference between Glendo and Patten Creek is the projectile system reflecting the introduction of the bow and arrow along with new point forms in the ongoing cultural tradition.

Although little data is available, the Keyhole Phase may be considered part of the TUNAXA cultural tradition. Both Patten Creek and Keyhole are succeeded by phases with tri-notched points.

SECTION 7: PARKER

Briefly, Parker may be summarized as follows:

(1) Fairly high frequency of unnotched points.

(2) Characteristic arrow point type is the Parker Corner Notched.

(3) Bifaces with modified hafting elements are rare. Other biface forms are characteristically symmetric ovates with convex bases.

(4) Irregular flake butt drills.

(5) Absence of dorsally finished end scrapers.

(6) Sand tempered undecorated cord roughened ceramics.

(7) Excavated basin-shaped hearths with rock or earth fill.

(8) Hunting-gathering-horticulture subsistence base.

(9) Primary flexed pit burial pattern with associated grave goods which include Olivella, tubular bone beads and clam shell pendants, but no pottery.

Similarities between Parker and Glendo are seen in:

(1) Convex lateral edge convex base and straight lateral edge convex base forms are the most common unnotched varieties in Parker and Glendo. They are fairly frequent in both phases.

(2) Pelican Lake Corner Notched atlatl points.

(3) Ruby Corner Notched arrow points in Parker are nonmetrically similar to Pelican Lake Corner Notched atlatl points in Glendo.

(4) Symmetric ovate bifaces are the characteristic type in both. Circular and symmetric ovate straight base are present in both.

(5) Irregular flake butt drills and perforators, oval butt drills and ovate perforators are present in both.

(6) Excavated basin-shaped hearths with rock or earth fill are present in Parker and Glendo.

(7) A primary flexed pit burial pattern with associated grave goods.

Differences between Parker and Glendo not accountable to the diffusion of later complexes are seen in:

(1) The absence of Snyder-like points and the infrequent presence of obtuse shouldered side notched points in Glendo.

(2) The nonmetric formal attributes of Parker Corner Notched are not represented on Glendo Phase forms.

(3) The absence of T-butt drills in Parker.

(4) Absence of dorsally finished end scrapers in Parker. Parker end scraper forms seem to be smaller and better finished than those of Glendo. Bifacial scrapers are present only in Parker.

(5) Pointed unifaces and domed side scrapers are present only in

Glendo. The latter are, however, absent in the Glendo component--Uhl Zone E.

Similarities between Parker and Willowbrook are seen in:

(1) Pelican Lake Corner Notched atlatl points.

(2) Two Parker atlatl types, the Snyder-like, and the obtuse shouldered convex base form (non-Besant variant) are similar to the Willowbrook variants. The latter also appear, occasionally in Glendo.

(3) Ruby Corner Notched arrow points in Parker are nonmetrically similar to Pelican Lake Corner Notched forms in Willowbrook.

Parker Corner Notched shows certain similarities to Willowbrook point attributes (recurvate body edges, asymmetric bodies, bulbous bases and serrations). These variations are generally absent in the Glendo projectile system. Since Parker Corner Notched also shows formal similarities to other arrow types such as Rose Spring Corner Notched, Basketmaker III, Fremont variations and Columbia Valley Corner Notched, we should not rely too heavily on the formal similarities to Willowbrook alone. Parker atlatl formal predecessors are to be found in the Foothills-Mountains-Basins rather than the Plains.

(4) With one exception bifaces with modified hafting elements are absent in Parker. This absence is a trait characteristic of Willowbrook rather than Glendo. However, one should note that the one excavated Glendo component in the Parker Phase area, Uhl Zone E, did not contain these forms of bifaces.

(5) Symmetric ovate bifaces.

(6) Presence of bifacial end scrapers.

(7) Rock-filled surface hearths are present in Parker (Foothills) and Willowbrook.

(8) Corn horticulture.

(9) A primary pit burial pattern if the Magic Mountain Zone B burial associates with the Willowbrook rather than Parker component at that site.

Differences between Parker and Willowbrook not accountable to the diffusion of later complexes are seen in:

(1) Unnotched points relatively frequent in Parker, absent in Willowbrook.

(2) Triangular bifaces characteristic of Willowbrook are absent in Parker. Symmetric ovate straight base and circular forms present in Parker are absent in Willowbrook.

(3) The absence of oval butt drills and ovate perforators in Willowbrook.

(4) Parker end scrapers tend to be smaller and better finished than those in Willowbrook.

(5) Presence of excavated basin-shaped earth or rock-filled hearths only in Parker.

From the above evidence I propose that Parker in the Plains and Foothills, represents the acculturation of both the Glendo and Willowbrook populations to a new cultural tradition (which will not be named). This new cultural tradition is the product not only of items introduced to the area, but also of considerable interchange and contact between the two indigenous populations.

Such items as ceramics, hearth types and unnotched point types, were accepted by the Foothills population from the Plains, and such items as Parker Corner Notched, obtuse shouldered convex base points, Snyder-like points and horticulture were accepted by the adjacent Plains population from the Foothills. Specific cultural continuity from Willowbrook to Parker in the Foothills can be seen in the bifacial end scrapers and rock-filled surface hearths. In sum, Parker represents a discrete cultural tradition which occupies an area formerly occupied by two discrete cultural units.

The presence of Besant Side Notched, Samantha Side Notched and Timber Ridge Side Notched is indicative of contact with the Besant or Avonlea phases to the north.

Similarities between the Keith and Parker phases are seen in:

(1) Straight lateral edge convex base and convex lateral edge convex base unnotched points are characteristic in both phases.

(2) Snyder-like points occur in both phases. The not infrequent presence of Scallorn points in Parker, and of Parker Corner Notched in Keith.

(3) High frequency of symmetric ovate bifaces and general lack of other biface types in both.

(4) Lack in both phases of pointed unifaces, domed side scrapers and rectangular dorsally finished side scrapers.

(5) Undecorated cord roughened ceramics in both.

(6) A hunting-gathering-horticultural base with the emphasis on smaller ungulates characterizes both.

(7) Excavated basin-shaped earth-filled hearths are present in both.

(8) Keith may have been characterized, at some early stage by primary pit burials (Massacre Canyon), like those in Parker.

Differences between Keith and Parker are seen in:

(1) Differential frequencies of the characteristic arrow points in each phase, Parker Corner Notched in Parker and Scallorn in Keith.

(2) Presence of dorsally retouched end scrapers only in Keith.

(3) Presence of cache pits and habitation structures only in Keith. Parker populations are nomadic hunter-gatherer-horticulturalists, whereas Keith populations are semisedentary hunter-gatherer-horticulturalists. Presence of excavated rock-filled hearths only in Parker.

(4) A major difference in burial patterns--primary pit burials in Parker versus secondary disarticulated pit or ossuary burial in Keith.

Some of these similarities may be interpreted to represent a partially common preceramic cultural heritage in the Pelican Lake Phase (i.e. high frequency of symmetric ovates, unnotched point frequencies, excavated basin-shaped earth-filled hearths and primary pit burials). Other similarities may represent contact and exchange of goods and/or people. Also there seems to be considerably more contact between the Keith and Parker populations than between Keith and Parker and Valley-Loseke.

Patten Creek is adjacent to Parker, and there is evidence of contact between the two. This contact may be represented in the occasional presence of Parker Corner Notched in Patten Creek, Scallorn in Parker, and Olivella beads in some Patten Creek burials. Similarities indicative of the common cultural heritage in the TUNAXA tradition are the excavated rock-filled hearths, unnotched point styles, symmetric ovate bifaces, lack of dorsal retouched end scrapers and a primary pit burial pattern.

The absence of pointed unifaces, domed side scrapers and rectangular dorsally finished side scrapers in Parker are indicative of the differences in the cultural traditions which exist between the two phases at this time level.

SECTION 8: ASH HOLLOW PHASE

Ash Hollow is a ceramic phase which occupies part of the Parker Phase area. Ash Hollow is defined on the presence of Ash Hollow cord roughened vessels and side notched and occasional tri-notched points. The map (Fig. 6) indicates that it is spatially adjacent to Parker and the dates indicate it is later than early Parker components. Certain Parker components such as Hall-Woodland are coeval.

Ash Hollow shows good cultural continuity with Parker in such items as Parker Corner Notched, symmetric ovate bifaces, end scrapers and excavated rock-filled hearths. Differences relating to contact by Ash Hollow with adjacent phases include the wider formal variation of unnotched points, presence of asymmetric lanceolate bifaces and possibly the secondary ossuary burial pattern.

The side notched and tri-notched point forms are not unlike Upper Republican forms, which might be a possible source for diffusion if Upper Republican to the east is coeval with these Ash Hollow components. However, side notched points are also present in Loseke, Old Women's and occasionally in Avonlea and Besant. These phases are all partially coeval with Ash Hollow. Tri-notched points also appear in both Avonlea and Old Women's. Asymmetric lanceolate bifaces, although not of the same specific form as Ash Hollow, are present in Loseke and Avonlea. The secondary ossuary burial

pattern with quantities of shell disk beads (possibly associated with Ash Hollow) may be indicative of the introduction of this burial pattern from Keith.

The Parker and Ash Hollow phases on the Plains are terminated by components characterized by side and tri-notched points and Upper Republican style ceramics. In the Denver Basin, Parker is followed by the Franktown Phase characterized by side and tri-notched points. In the Foothills, Fremont and Intermountain style ceramics appear at a late date.

CHAPTER TWELVE

CONCLUDING REMARKS

SUMMARY

In previous chapters I have examined several Northern Plains phases and their relationships, and have attempted to integrate and interpret them in terms of ongoing cultural traditions. The first of these, TUNAXA, is a widespread hunting-gathering cultural tradition of the Northern Plains. It exists for at least 2.5 millenia and, in the Pelican Lake Phase consists of a number of locally adapted sociocultures which participate to a greater or lesser extent in an overall unifying cultural tradition.

In the period ca. A.D. 1-400, some local cultures, whose origins I postulate to be in the TUNAXA tradition, undergo considerable change, becoming phases of new cultural traditions. Two such cultures are semi-sedentary with subsistence based on hunting, gathering and corn horticulture. They are represented by the Valley-Loseke and Keith phases, which have ceramics, semipermanent villages with habitation structures and storage facilities. The emergence of the Plains Horticultural subsistence tradition is the result of the acceptance by indigenous plains populations of the above systems primarily from the Middle Woodland period of eastern North America.

The Parker Phase, both ceramic and horticultural, has its cultural roots in both the TUNAXA cultural tradition and the PICOSA cultural tradition as exemplified in the Willowbrook Phase. Although dependant on hunting, gathering and horticulture Parker does not attain the degree of sedentarism of Keith, Valley and Loseke.

In other areas ecologically unsuited for stable corn horticulture at this time level, the TUNAXA cultural tradition continues as a basic hunting-gathering adaptation into the Avonlea Phase in the bison-rich Northwestern Plains, and into the Keyhole and Patten Creek phases in the Missouri and North Platte Basins in Wyoming.

Avonlea arrow points, the earliest on the Northern Plains, are apparently diffused at different rates into the resident groups of the TUNAXA cultural tradition. In some regions (Patten Creek, Keyhole) the Avonlea point is not completely accepted, and other arrow point forms

supersede it rapidly. At ca. A.D. 600 the TUNAXA cultural tradition in the Big Horn and Shoshone basins is acculturated by peoples of a cultural tradition originating in the mountainous west.

The NAPIKWAN cultural tradition appears on the Plains at approximately the same time that the TUNAXA cultural tradition is undergoing divergence and change. As represented in the Besant Phase it is a nomadic hunting-gathering culture characterized by a distinctive lithic artifact assemblage and in some areas ceramics, burial mounds and occasional habitation structures. Although origins are obscure, evidence suggests that it has been a resident plains tradition on the Northeastern Periphery since possibly 500 B.C.

The NAPIKWAN tradition having acquired ceramics, habitations and burial practices through contact with Middle Woodland cultures, expanded physically to the Missouri Basin, briefly displacing the resident TUNAXA populace from parts of the Northern Plains. This physical and cultural domination was incomplete, however, and the TUNAXA tradition continued as the Avonlea Phase, which coexists in space and time with the Besant Phase of the NAPIKWAN tradition. Although much contact between the two groups occurred, each maintained its own cultural identity, and by A.D. 700-800, NAPIKWAN became dominant in the Saskatchewan Basin and TUNAXA in the Upper Missouri Basin. By A.D. 800-1000 new phases and cultural traditions appear throughout the area.

GENERAL CONSIDERATIONS

The cultural traditions exhibit three basic types of economic adaptations: communal bison hunters-gatherers, generalized hunters-gatherers, and generalized hunter-gatherer-horticulturalists. These basic adaptations seem to correlate with environmental variables (large bison populations, generalized ungulate populations, and environmental suitability for corn horticulture).

Lee and DeVore (1968) have drawn certain general conclusions about present-day hunter and gatherers. The application of these concepts to our nomadic communal bison hunters on the Northern Plains may be based on

unwarranted assumptions concerning such basic aspects as population density and social organization. The general impression, despite a few statements to the contrary (cf. Lehmer 1963), is that prior to acquisition of the horse and firearms man lived in small social units at a band level of organization, and never achieved even seasonal tribal integration (cf. Teft 1965; Oliver 1962). According to them it was only with the introduction of the horse and firearms that man acquired the technological capability to utilize the Northern Plains environment efficiently and develop tribal integration.

Although I do not propose to deal at any length with this problem here, and while I do not deny that many aspects of the culture changed with the introduction of the horse, I do wish to point out a few important facts which indicate that the shift from band to tribe (Teft 1965; Oliver 1962) at the protohistoric level is not necessarily valid for all Northern Plains populations.

Lee and DeVore (1968:11) suggest:

> Throughout the world hunter densities rarely exceed one person per square mile; most of the accurate figures reported at the conference ranged between one and 25 persons per hundred square miles. We feel that the one-per-square-mile figure is a useful estimate of Pleistocene carrying capacity.

While this is extremely speculative, the available biomass in the Northern Plains may have been similar to that of the Pleistocene in Europe and applying these figures to the study area in general ca. 1×10^6 square miles, a carrying capacity of 1,000,000 (1/square mile) is arrived at. Since the most successful adaptation seems to be a population stabilized at 20-30 per cent of carrying capacity (Lee and DeVore 1968:11), I would estimate a population resident in the study area at a pre-agricultural time level ca. A.D. 1 of 200,000 to 300,000 people.

One may assume these groups to more or less conform to the "Nomadic Style" (Lee and DeVore 1968:11)--groups which move around a lot, associate with geographical range, but do not operate as closed systems. The frequency of communication between groups results in a hunting society

composed of a number of local bands forming a larger breeding and linguistic community. The economic system is based on a home-camp and sexual division of labor (males hunting, females gathering), and a collective method of redistributing the food. The social system was generally egalitarian, with little personal property. Constraints existed to minimize wealth differences. The living groups varied throughout the year in size and composition. No one group had exclusive rights to resources, and this would prevent set patterns of group territoriality. Food storage would be at a minimum, since the environment was the storehouse.

Prehistoric settlement patterns varied considerably in the Northern Plains. In the Pelican Lake Phase there was evidence in both the Blue Slate Canyon and Spring Creek Subphases of seasonal transhumance with hunting in the montane forests and alpine zones during the summer and winter occupation on the valley floors.

In the bison-rich areas the data indicate a settlement pattern for Pelican Lake, Besant and Avonlea essentially similar to that of historic times. The seasonal round consisted of a winter campsite in a sheltered creek or river bottom adjacent to water and fire wood and the use of major bison drives two times per year--in spring when the bulls are prime and in the fall when the cows are prime. The latter, as in historic times, seems to have been the major drive. Spring-summer occupations between the drives seem to have occurred on the coulee tops and are apparently associated with tipi rings (Reeves 1967).

The nomadic communal bison hunters of the Northern Plains probably differ from the "Nomadic Style" of Lee and DeVore in a number of specific ways. Possibly wintering residential groups were larger. We can visualize them as related bands linked into a larger hunting society (tribe). These bands would, as in historical times (Teft 1965; Oliver 1962) achieve seasonal tribal integration during the time of the major bison drives.

I suggest that pan-tribal sodalities were also present. These sodalities would be somewhat similar to the dog soldiers (Ewers 1955; Oliver 1962) of historic times and their major function as in historic times, would be to control group activity during the communal bison drives. The

numerous sodalities of the nomadic High Plains groups known historically seem to have funtioned mainly in the socio-political sphere especially in the organization of communal "drives" such as macroband hunts, band movements, horse-stealing raids, and the like.

Although one can only speculate, a concentration of 1000-2000 people would not, I think, be unrealistic at the time of year when the major drives were in progress. The complexity of the operations involved a major bison drive at a site such as Head-Smashed-In would suggest that pan-societal sodalities of some type would be required to manage and direct the group activity.

Band organization was probably composite rather than patrilocal. Lee and DeVore (1968:8) point out that:

> The fluid organization of recent hunters has certain adaptive advantages, including the adjustment of group size to resources, the leveling out of demographic variance, and the resolution of conflict by fission. These features are independant of the effects of acculturation and would have been no less adaptive in precontact situations.

That such form of band organization may have existed in Pelican Lake, Avonlea and Besant is suggested by the homogeneity of the artifact systems. Differences in the observed artifact systems are most obvious in projectile points. In all three phases there is very little variation, compared to that in adjacent areas at the same time level e.g. Birch Creek. Two variables--specialization and residence--may be interacting to produce this lack of observed variation. Since tool manufacture is transmitted from one to another generation by groups of related males, the lack of variation in the projectile system would suggest that the manufacture of the points was restricted to relatively few groups and that all flint knappers made essentially the same point form. Similar lithic suites indicate that a good deal of trade of finished products and possibly point forms, occurred between groups, or that a fluid group composition with a lack of firm residential rules (i.e. composite bands) existed. To what extent these variables interact cannot presently be demonstrated.

Little can be said concerning culture change and the artifact system.

In general the projectile point forms seem to be relatively stable through time within any one cultural system. For example Pelican Lake Corner Notched has a duration of ca. 1 millenium in the TUNAXA cultural tradition.

A major technological change occurring during the first millennium A.D. is the introduction of the bow and arrow, and it is significant to note that within a cultural tradition the technological change-over may be rather slow. In Besant the change requires some 300-400 years.

It has, I hope, been demonstrated that both external boundaries and internal phase boundaries can be quite sharply defined. I suggest that the external phase boundaries relate to definite socio-cultural and genetic boundaries (Birdsell 1953, 1957, 1958). Such boundaries in space would be Glendo and Willowbrook or Valley-Loseke and Keith or in time, Besant and Pelican Lake.

THE NAPIKWAN EXPANSION

My final concern is an examination of some possible mechanisms which allowed and controlled the Besant Phase expansion in the Northern Plains. Since the TUNAXA cultural tradition was well adapted to its environment one may assume that the Law of Cultural Dominance (Sahlins and Service 1960) was operative in some form. Otherwise, presumbably Besant could not have displaced the TUNAXA population.

Besant in the Northwest Plains evidences a basic adaptation similar to Pelican Lake. Its technology, as far as can be seen, is no more efficient in terms of energy extraction or in offense/defence. There are some differences in terms of mobilization. Better lines of trade and/or transport may be inferred from the tremendous quantities of Knife River flint utilized in Besant sites in the far west: Muhlbach is over 600 air miles from the quarries. This evidence points to well-developed and strong lines of communication between the groups on the Middle Missouri and those in the Northwestern Plains. One might speculate that Besant peoples had new methods of water transport which were very effective on the river systems.

Probably Besant social organization was similar to Pelican Lake in that the society consisted of a number of related bands in which pan-

tribal sodalities operated at the time of the communal bison hunts. However, the evidence for strong lines of communication and the presence of mound burials indicates that the Besant social organization is somewhat different from Pelican Lake.

If the Pelican Lake burial pattern is similar to that of the Glendo Subphase, then there was little status difference between members of the society. In contrast, the Besant mound burial patterns may be interpreted as representing the interment of groups or individuals of high status and rank; with the associated grave goods representing either personal property and/or formal rank insignias (cf. Eyman 1966), indicating the presence of some degree of ranking within Besant society, and the associated burial of bison skulls and carcasses suggests that these groups, lineages, or sodalities controlled the economic activity--specifically the communal driving of bison (a bimodal burial pattern in not however evident for Besant).

Because mound burial was acquired along with other items from the Middle Woodland cultures in the Eastern Woodland, I would speculate that the following changes occurred in Besant social organization. Prior to participation in or contact with, the Hopewellian Interaction Sphere, Besant society was egalitarian and similar to Pelican Lake with sodalities which controlled the communal bison drives. As a result of contact, these sodalities, which already controlled the economic activity attained greater status within Besant Society. This change is reflected in the mound burial pattern.

Expansion of the Besant Culture west to the Missouri and beyond occurred as a result of participation on the Interaction Sphere and pressure by the high status groups to gain direct control of the economic resources which were being traded into the Hopewellian centers.

Eyman (1966) suggests that either trading expeditions from Schultz and/or Kansas City took goods into Illinois Hopewell or that trade expeditions from the latter carried items of exchange to Kansas City. Possibly a similar mechanism was operative between Besant and Illinois Hopewell. Eyman also suggests that a person of high status--perhaps a "priest"--

accompanied the Illinois expeditions, and rather than attempting to convert the natives, his funciton was to control the trade group and account for the trade inventories. It was through this mechanism that the Schultz Focus natives of high status learned about the mound mortuary complex--how one was "buried in style," (Eyman 1966:320-1). This would also provide a plausible explanation for the introduction of the mound burial pattern in Besant.

Knife River flint, obsidian, grizzly bear teeth and perishables such as bison hide and dried meat may have been traded by Besant to Hopewell. In return Besant received copper, antler pins, Olivella, conch and dentalium shell ornaments; pottery, and possibly perishables such as corn. The marine shell ornaments may not have come directly from Illinois Hopewell but from Kansas City area since they are also present there (Wedel 1943), or in the case of Olivella from the Colorado Parker Phase. But since no mounds of equivalent age are known between Besant and the Kansas mounds, I take this lack of evidence to suggest that the trade probably went overland into the tributaries of the Mississippi. The presence of obsidian in Malmo mounds might indicate that this was the route.

Griffin (1968) presents a convincing argument that the majority of Ohio Hopewell obsidian was obtained in a single expedition. His main evidence for this thesis is that the Ohio distribution seems to be best interpreted as a single event ca. A.D. 100-200. He argues that we should "expect to find significant amounts of obsidian from a fairly large number of Middle Woodland sites between the Upper Mississippi and the Rocky Mountains. This is not now the case" (1965:147). Griffin, however, feels that the Illinois obsidian does not represent the same event. As I have pointed out, the lack of obsidian in Besant may be interpreted as indicative of its value in trade which greatly outweighed its superior manufacturing qualities.

In sum, I propose the following hypothesis. Besant expanded westward onto the Missouri and upriver into the Upper Missouri and Saskatchewan basins as a result of participation in the Hopewellian Interaction Sphere. This participation caused a change in social organization and communication

systems with the consequence that cultural and perhaps physical dominance over some indigenous TUNAXA peoples was accomplished in a relatively brief interval ca. A.D. 1-250. This expansion gave Besant Peoples access to the obsidian and Knife River flint quarries and the bison-rich country of the Northwestern Plains. Trade goods were shipped downriver and overland to the Illinois and Ohio Hopewellian centers in return for certain perishable and non-perishable goods.

It is evident that their access to Obsidian Cliffs was short-lived and, although they possessed a more complex social organization their population numbers and technology were inadequate to completely displace all TUNAXA population, who, we may conjecture, regained control of the obsidian quarries and gained a technological advantage in the bow and arrow. The result was that the two cultures coexisted in the same area until ca. A.D. 700, when one or the other (Besant had by this time almost completely adopted the bow and arrow) became dominant. Since both cultures would be operating well below the carrying capacity, 20-30 per cent for each, sufficient environmental energy was available for support of both groups.

To what extent environmental changes, such as the Temple Lake ice advance in the Rocky Mountains during the Sub-Atlantic and the Parkland shifts, played a part in the expansion of the Besant Phase population cannot be determined at this time. Increased snow packs, and regenerated Alpine glaciers in the Canadian Rockies may have had an important effect on the Mortlach Subphase populations resident in southwestern Alberta and the adjacent Rocky Mountain Trench at this time, if these populations had a seasonal transhumance between the two areas similar to that of the Kootenais in historic times.

CONCLUDING REMARKS

I have not in the preceding thesis made any attempt to assign language affiliations to any of the cultural traditions or phases defined in this thesis. On the basis of somewhat dubious postulates, point types and traditions have been assigned to various language families by other workers, which obscure the issues at hand and over-simplify a highly complex situation: Avonlea points to Athabascans (Kehoe and Kehoe:1968); Besant to Athabascans (Husted and Mallory:1967); McKean to Uto Aztecan and Bitter-

root to Mosan (Husted 1968); Bitterroot to Shoshone (Swanson and Sneed 1966).

I feel these are tenuous suppositions at best, and are based on reasoning which presupposes that point types associate with language families (Projectile Linguistics) and that one glottochronological construct is better than another. They fail to recognize that different linguistic groups may share the same material culture and vice versa. They assume that old languages never die, nor even fade away.

These linguistic speculative ideas and suggestions are antiquitarian in nature and add nothing to Plains anthropological archaeology by an a priori assignment of point types.

To conclude a lengthy dissertation, the writer is not concerned as to whether the conclusions and hypotheses presented in this thesis stand the test of time. I hope that they stimulate other workers to publish data on hand, and to inaugurate new excavations and interpretations. But if nothing else, I hope that I have demonstrated that Northern Plains Prehistory, outside the mud hut area, is complex and dynamic, and should not be blithely dismissed as an extension of the Middle Missouri, Eastern Woodlands, or the Great Basin culture areas.

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TABLES & FIGURES

INDEX KEYS FOR TABLES 1-10

Archaeological Data Index

A. Artifacts observed by writer
   (a) Total or majority of assemblage observed by writer
      1. Photographed by writer
      2. Collection in possession of or loaned to The University of Calgary
   (b) Partial assemblage observed by writer
      1. Photographed by writer
      2. Collection in possession of or loaned to The University of Calgary

B. Artifacts not observed by writer, published or unpublished primary source for artifactual data
   1. Adequate descriptions and/or illustrations of artifacts
      (a) Total or majority of assemblage
      (b) Partial assemblage only
   2. Poor descriptions and/or illustrations of artifacts
      (a) Total or majority of assemblage
      (b) Partial assemblage only
   3. Description and/or illustrations generally lacking for artifacts
      (a) Total or majority of assemblage
      (b) Partial assemblage only
   4. Assemblage referenced elsewhere, primary artifactual data source unavailable
      (a) Total or majority of assemblage
      (b) Partial assemblage only

C. Written or verbal communication only source available

Stratigraphic Index

1. Excellent stratigraphy, good separation of components if site is multicomponent or single component site
2. Fair stratigraphy, some mixing of components

3. Poor stratigraphy, components badly mixed
4. No stratigraphy
5. Unknown

Table 1 Pelican Lake Phase Components (Fig. 3)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Glendo Subphase				
a. Habitation Components				
Angostura Reservoir				
39FA36-B (Hearths)	B1b	1	3:b15	Wheeler 1958: Part 1
Ash Hollow Lenses E, F, G	B1a	1	3:b8	Champe 1946
Cedar Canyon	C	5	3:b10	Champe 1946
Glendo Reservoir				
48PL21	B1a	1	3:b13	Mulloy & Steege 1967
48PL23	B1a	1	3:b13	Mulloy & Steege 1967
48PL24 Lower	B1a	1	3:bk3	Mulloy 1965
Happy Hollow	B1a	3	3:b7	Steege 1967
Limestone Butte Focus	B3b	5	3:b15	Hughes 1949
Signal Butte Level II	B1a	1	3:b11	Forbis n.d.
Uhl Zone E	B1a	1	3:b6	J. J. Wood 1967

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
b. Kill Components				
Lance Creek	C	5	3:b14	G. Agogino Pers. Comm. 1968
c. Burial Components				
Bisterfeldt	B1a	2	3:b12	Breternitz & Wood 1965
Huffman	B4	5	3:b9	Kivett 1952, Neuman 1967a
Gahagan Lipe	B1a	1	3:b5	J. J. Wood 1967
Witkin	B1a	1	3:b4	Swedlund & Goodman 1966
25SF10	B4	5	3:b12	Champe 1949, Kivett 1952, Neuman 1967a
39FA30	B1a	1	3:b15	Wheeler 1958: Part 1
2. Badger Subphase				
Good Soldier Badger Component	B1a	2	3:c16	Neuman 1964b
Fort Thompson Reservoir Soil Zone 3	B1b	2	3:c17	Neuman 1964a

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
3. Upper Miles Subphase				
a. Habitation Components				
Keyhole Reservoir				
48CK29	B1b	1	3:d18	Wheeler 1958: Part II
48CK39	B1b	1	3:d18	Wheeler 1958: Part II
48CK46	B1b	1	3:d18	Wheeler 1958: Part II
Ludlow Cave Pelican Lake Points	B2b	4	3:d22	Over 1936
McKean Level 1	B1a	3	3:d19	Mulloy 1954a
Medicine Creek Cave Pelican Lake Points	B1b	4	3:d20	Buckles 1964
Mule Creek Rockshelter Component B	B1a	1	3:d18	Wheeler 1958: Part II
Riva Levels I and III	B1a	2	3:d21	Gant 1961

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
b. Kill Components				
Bentley	Alb	1	3:d24	Appendix I
Charlotte	Alb	1	3:d26	Appendix I
State Line	Alb	1	3:d23	Appendix I
Upper Miles	Alb	1	3:d25	Appendix I
4. Spring Creek Subphase				
Bentzen-Bald Mountain	Bla	2	3:e27	Bentzen 1963
Birdshead Cave Component F	Bla	1	3:e35	Wheeler 1958: Part II
Bottleneck Cave	C	5	3:e28	W. Husted Pers. Comm.
Boysen Reservoir				
48FR5	Bla	1	3:e34	Mulloy 1954b
48FR33	Bla	3	3:e34	Mulloy 1954b
48FR34 Lower	Bla	1	3:e34	Wheeler 1958: Part III

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Daugherty	C	5	3:e31	G. Frison Pers. Comm. 1967
48J0301	B4	5	3:e60	Frison 1965
Mummy Cave Layers 32 and 34	C	5	3:e29	Wedel, Husted, and Moss 1968
Spring Creek	B1a	1	3:e32	Frison 1965
Ten Sleep	B4	5	3:e30	Frison 1965
Wedding of the Waters Level II	B1a	1	3:e33	Frison 1962
5. Keaster Subphase				
a. Habitation Components				
BEL	A1b	4	3:f48	Appendix I
Eagle Creek Level 2	C	2	3:f36	Arthur 1966
Pictograph Cave II	A1b	2	3:f38	Mulloy 1958
Stark Lewis Levels 2, 3, 4	A2a	1	3:f49	K. Feyhl Pers. Comm. 1968

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
b. Kill Components				
Adkins	A1b	1	3:f42	Appendix I
Billings Bison Trap	A1b	2	3:f39	Mulloy 1958
Carter Ferry	B1a	1	3:f46	Shumate 1967
Emmigrant	A1b	2	3:f37	Arthur 1966, Brown 1932
Glendive	A2b	5	3:f41	Appendix I
Keaster	A2a	1	3:f45	Davis and Stallcop 1965
Madison	B3b	1	3:f47	Napton 1967
Malta	A1b	1	3:f44	Appendix I
Round Up	A1b	1	3:f50	Appendix I
Ruffato	A1b	1	3:f43	Appendix I
Tibbits	A1b	1	3:f40	Appendix I

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
6. Blue Slate Canyon Subphase				
Blue Slate Canyon Levels 2-5	A2a	1	3:g51	Reeves 1967b
Avon Quarry	A2b	4	3:g52	Appendix 1
DgPl-47 Lower	A2a	1	3:g51	Reeves 1968
DgPl-4 Level IV	A2a	2	3:g51	Reeves 1968
7. Mortlach Subphase				
a. Habitation Components				
Mortlach Levels 5A, B, C	B1b	2	3:h55	Wettlaufer 1956
Long Creek Level 4	B1b	2	3:h57	Wettlaufer 1960
Walter Felt Layers 13b, c, 15 a-d	A1b	1	3:h56	Watson Pers. Comm. 1967
b. Kill Components				
Head-Smashed-In Buffalo Jump Pelican Lake Components	A2a	1, 2	3:h54	Appendix 1

Table 1 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Old Women's Buffalo Jump Layers 18, 20-28	A2a	1, 2	3:h54	Forbis 1962
8. Larter Subphase				
Larter	B1b	2	3:i58	MacNeish 1958
Lockport Levels 11, 12	B1b	1	3:i59	MacNeish 1958

Table 2 Besant Phase Components (Fig. 4)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
a. Ceramic Components				
Avery	A1b	3	4:15	Joyes 1967
Fresno Reservoir				
24HL103	A2a	4	4:42	L. B. Davis Pers. Comm. 1968
Maynard	A2a	4	4:45	L. B. Davis Pers. Comm. 1968
Overs La Roche Village (39ST9) House 2 Area 2	B1b	2	4:26	Hoffman 1968
Porcupine Creek (32S16)	A2a	1	4:19	Sheans 1964
Stelzer	A1b	1	4:25	R. Neuman Pers. Comm. 1967
Walter Felt Layer 13a	B4	5	4:9	Kehoe 1964, Watson Pers. Comm. 1967
Williston	A2a	2	4:18	W. R. Wood 1956

Table 2 Continued

Site/Component	Data Index	Strat Index	Figure reference	Source Reference
United Church	B2b	3	4:12	MacNeish and Capes 1958
b. Aceramic Components				
Avon Quarry	A2b	4	4:38	Appendix I
Burns Ranch	A2a	1	4:2	
Calf Mountain	Ala	2	4:16	C. Vickers Pers. Comm. 1967
Keyhole Reservoir				
48CK209	Bla	1	4:30	Wheeler 1958: Part II
Kenny Layers 6, 8	A2a	1	4:6	Reeves 1966
Krieger	Alb	2	4:13	Vickers 1948a
Long Creek	Bla	1	4:17	Wettlaufer 1960
Lissolo Cave Level 3	Bla	1	4:33	Steege and Paulley 1964
Ludlow Cave Besant Points	B2b	4	4:27	Over. 1936

Table 2 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
McKean Level 1 (part thereof)	B1a	3	4:31	Mulloy 1954
Medicine Creek Besant points	B1a	4	4:29	Buckles 1963
Morris Church Level 2	A1a	1	4:7	N. Lane Pers. Comm. 1967
Mortlach Levels 3, 4A, 4B, 4C, 4D, 4E	B1b	2	4:8	Wettlaufer 1956
Riva II	B1a	2	4:28	Gant 1961
Ruby Camp	A2a	1	4:32	Appendix I
Stark-Lewis Level 1A	A2a	1	4:35	K. Feyhl Pers. Comm. 1968
Walter Felt Layer 10	A1b	1	4:9	G. Watson Pers. Comm. 1967
Trout Creek	A2a	1	4:4	W. Byrne Pers. Comm. 1967

Table 2 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
3. Kill Components				
Agency	A2b	1	4:40	Appendix I
Bakken-Wright	B2b	1	4:10	Wright 1965
Brockton	Ala	1	4:34	Appendix I
Dago Hill	Ala	1	4:44	Shumate n.d.
Harlowton	Ala	1	4:37	Appendix I
Head-Smashed-In Besant Components	A2a	3	4:5	Appendix I
Leavitt	A2a	1	4:46	Appendix I
Malta	Ala	1	4:39	Appendix I
Mulbach	A2a	1	4:1	Gruhn 1967
Old Women's Buffalo Jump Layers 14b, 15-17, 19	A2a	1, 2	4:3	Forbis 1962
Richards	Aa	1	4:14	Hlady 1967

Table 2 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Round Up	A1a	1	4:36	Appendix I
Ruby Kill	A2a	1	4:32	Appendix I
Stellings	A1a	1	4:43	Appendix I
Wahkpa Chugn (24HL101) Area B	A2a	1	4:41	Davis and Stallcop 1967
4. Burial Components				
Alkire	B1a	1	4:21	Henning 1965
Arpan	B4	1	4:23	Neuman 1967b
Bald Hill	B1a	1	4:17	Hewes 1949
Boundary	B1a	1	4:20	W. R. Wood 1960, Neuman 1967b
Grover Hand	B4	1	4:24	Neuman 1967b
Swift Bird	B4	1	4:22	Neuman 1967b

Table 3 Avonlea Phase Components (Fig. 5)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
a. Ceramic Components				
Garratt (EcNj-7)	B4	5	5:7	Watson 1966
Head-Smashed-In Campsite	A2a	3	5:2	Appendix I
Mud Creek	A2a	5	5:26	P. English Pers. Comm. 1968
Trout Creek	A2a	2	5:1	W. Byrne Pers. Comm. 1967
b. Aceramic Components				
Avery	A2a	3	5:11	Joyes 1967
Angostura Reservoir				
39FA35	B1b	1	5:14	Wheeler 1958: Part I
39FA36A	B1b	1	5:14	Wheeler 1958: PartI
Lissolo Cave Level 1	B1b	1	5:15	Steege and Paulley 1964

Table 3 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Long Creek Level 2	B1a	1	5:10	Wettlaufer 1960
Ludlow Cave Avonlea Points	B2b	4	5:12	Over 1936
McKean Level 1 (part thereof)	B1a	3	5:16	Mulloy 1954
Medicine Creek Cave Avonlea Points	B2b	4	5:13	Buckles 1963
3. Kill Components				
Avonlea	B1b	1	5:8	Kehoe & McCorquodale 1961
Bakken-Wright	B2b	1	5:6	Wright 1965
Big Badger	B4	5	5:23	Davis 1966
Cherry Lake	Br	5	5:9	Kehoe & McCorquodale 1961
Crawford	B4	5	5:22	Davis 1966
Emmigrant	A2b	2	5:20	Brown 1932, Arthur 1966
Gull Lake	B4	1	5:5	Kehoe 1966

Table 3 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Head-Smashed-In Avonlea Phase Components	A2a	1, 2	5:2	Appendix I
Malta	A1b	1	5:29	Appendix I
Rhinehardt	B4	1	5:24	Davis 1966
Saco	B4	1	5:28	Davis 1966
Three Buttes	B4	1	5:27	Davis 1966
Timber Ridge	B1b	1	5:25	Davis 1966
Ulm	B4	1	5:21	Davis 1966
Upper Kill	A2a	2	5:3	Forbis 1960
Verlo	B4	5	5:4	Kehoe & McCorquodale 1961
3. Burial Components				
Billy Creek	B1a	1	5:18	Galloway 1968
Leath	B1a	1	5:17	Galloway 1962
PK	B3	1	5:19	Bass and Lacy 1963

Table 4 Valley Phase Components (Fig. 6c)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
Dads Lake	B3b	5	6:c41	Hill and Kivett 1941
Leahy	B3b	5	6:c31	Hill and Kivett 1941
Naper	B3b	5	6:c39	Hill and Kivett 1941
Sondegard	B3b	5	6:c43	Hill and Kivett 1941
Schultz Vy-1	A1b	1	6:c42	Hill and Kivett 1941
25CE4	B3b	5	6:c40	Price 1956
25CD10	B3b	5	6:c34	Price 1956
25DK4	B3b	5	6:c34	Price 1956
25DK20	B2b	5	6:c34	Price 1956
25DX5	B3b	5	6:c35	Price 1956
25HT4	B3b	5	6:c38	Price 1956
25HT8	B3b	5	6:e57	Price 1956

Table 4 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
2. Burial Components				
Bakenhouse	B3b	5	6:c46	Hill and Kivett 1941
Christianson	B3b	5	6:c32	Hill and Kivett 1941
Loseke Creek Burial No. 4	B3b	1	6:e54	Kivett 1952
Schultz Hill and Trash Heap	A1b	1	6:c42	Hill and Kivett 1941
Whalen	B3b	1	6:c45	Hill and Kivett 1941
25DK2	B3b	5	6:c34	Price 1956
25DO2	B3b	5	6:c33	Price 1956
25DX4	B3b	5	6:c36	Price 1956

Table 5 Loseke Creek Phase Components (Fig. 6e)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
Arp	B2a	3	6:e61	Gant 1967
Loseke Creek Sites (Feye and Lawson)	B1a	1	6:e54	Kivett 1952
Scalp and Ellis Creek	B1a	3	6:e58	Hurt 1952
Tramp Deep	B3a	1	6:e65	Howard and Gant 1966
25DK3	B3b	5	6:e55	Price 1956
25DK5	B3b	5	6:c33	Price 1956
25DX2	B3b	5	6:e35	Price 1956
25DX6	B3b	5	6:e35	Price 1956
2. Burial Components				
Arp Mound	B1a	1	6:e61	Gant 1967
Eagle Creek 25HT1	B1a	1	6:e57	Price 1956
Old Quarry	B4	5	6:e59	Neuman 1967b

Table 5 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Scalp Creek Mound	B3	5	6:e58	Hurt 1952
Sherman Park	B1b	1	6:e66	Gant 1963
Side Hill	B4	5	6:e60	Neuman 1967b
Truman	B1a	1	6:e60	Neuman 1960
Wheeler Bridge	B2a	1	6:e62	Cooper 1949
White Swan	B2a	1	6:e63	Cooper 1949
Wolf Creek	B3	5	6:e85	Gant 1962
25KX6	B3b	5	6:e64	Price 1956
25KX8	B3b	5	6:e57	Price 1956
25KX207	B1a	2	6:e56	Howard and Gant 1966

Table 6 Keith Phase Components (Fig. 6a)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
Carmondy	B1a	1	6:a13	Kivett 1952
Coil Oil Canyon	B2a	3	6:a29	Bowman 1960
Elm Creek	B3a	5	6:a3	Smith 1949
Massacre Canyon	B1a	1	6:a30	Kivett 1952
Medicine Creek Reservoir	B3	1	6:a11	Kivett 1949a
Ough	B3a	5	6:a14	Hill and Kivett 1941
Pottorf	B2a	1	6:a1	Wedel 1959
Walter	B3a	1	6:a2	Wedel 1959
West Island	B1a	1	6:a5	Witty 1966
25RW28	B4	5	6:a12	Long 1965:246
14CL302	B1a	2	6:a4	Witty 1962
14RU302	B1a	1	6:a4	Witty 1962

Table 6 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
14RU303	B1a	1	6:a4	Witty 1962
Red Cloud	B3a	5	6:a8	Hill and Kivett 1941
Red Rock Canyon	B3a	5	6:a3	Smith 1949
2. Burial Components				
Flag Creek	B4	5	6:a9	Kivett 1953
Holdridge	B2a	1	6:a6	Wedel 1935
Guide Rock	B4	5	6:a7	Kivett 1953
Massacre Canyon	B1a	1	6:a30	Kivett 1952
Medicine Creek	B3	1	6:a11	Kivett 1949a
Orleans	B4	5	6:a9	Kivett 1953
Robb	B4	5	6:a7	Kivett 1953
Woodruff	B1a	1	6:a10	Kivett 1953

Table 7 Parker Phase Components (Fig. 6b)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
Biggs Stratum IV Location II; IIc Location I	Bla	1	6:b15	J. J. Wood 1967
Hackberry Canyon	Bla	1	6:b88	J. J. Wood 1967
Hall-Woodland	Bla	1	6:b26	Nelson 1967
Happy Hollow	Bla	3	6:b21	Steege 1967
Kasper Complex A	Bla	1	6:b44	J. J. Wood 1967
Kassler Quadrangle Sites	B4	5	6:b27,28	Scott 1963
LoDaisKa Zone B	Bla	3	6:b24	Irwin and Irwin 1959
Magic Mountain Zone A and B (impart)	Bla	2	6:b25	Irwin-Williams and Irwin 1966
McEndeffer Rockshelter Complex A	Bla	1	6:b88	J. J. Wood 1967
Michaund A	C	1	6:b23	J. J. Wood 1967
Uhl Zone D	Bla	1	6:b17	J. J. Wood 1967

Table 7 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Willowbrook Level I	B1a	1	6:b37	Leach 1966
5WL43	B1a	1	6:b44	J. J. Wood 1967
5WL44	B1a	1	6:b44	J. J. Wood 1967
5L07	B1a	1	6:b16	J. J. Wood 1967
5L09	B1a	1	6:b16	J. J. Wood 1967
5MH1	B1a	1	6:b44	J. J. Wood 1967
2. Burial Components				
Hazelton Heights	B1a	1	6:b22	Buckles 1963
Howard Rollin	B4	1	6:b18	J. J. Wood 1967
Hutcheson	B1a	1	6:b20	Wade 1966
Magic Mountain A	B1a	1	6:b25	Irwin-Williams and Irwin 1967
Michaud A	B4	1	6:b23	J. J. Wood 1967
Young	B1b	1	6:b47	Wedel 1959

Table 8 Ash Hollow Phase Components (Fig. 6d)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Habitation Components				
Ash Hollow Zone D	B1a	2	6:d51	Champe 1946
Agate Bluff	B2a	1	6:d19	Irwin and Irwin 1957
Hatch B	B1a	1	6:d50	J. J. Wood 1967
Kelso	B1a	1	6:d49	Kivett 1952
25CE5	B3b	5	6:d49	Price 1956
25CE6	B3b	5	6:d48	Price 1956
2. Burial Components				
Blisterfeldt Ossuary	B1a	2	6:d53	Wood and Breternitz 1965
25SF10 Ossuary	B4	5	6:d52	Champe 1949, Kivett 1952, Neuman 1967a

Table 9 Patten Creek (Fig. 6g) and Keyhole Phase Components (Fig. 6f)

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Patten Creek Phase				
a. Habitation Components				
Glendo Reservoir				
48PL24 Upper	B1a	1	6:g72	Mulloy 1966
Patten Creek	A1b	1	6:g71	Keller Pers. Comm.
b. Burial Components				
Laramie	B1a	1	6:g75	Agogino 1961
Mahoney	B1a	1	6:g74	Galloway 1963
Silver Springs	B1a	1	6:g73	Steege 1960
2. Keyhole Phase				
Keyhole Reservoir				
48CK6	B1b	1	6:f68	Wheeler 1958: Part II
48CK10	B1b	1	6:f69	Wheeler 1958: Part II
48CK35	B1b	1	6:f70	Wheeler 1958: Part II
McKean Level I (part thereof)	B1a	3	6:f67	Mulloy 1954a

Table 10 Todd (Fig. 6h) and Willowbrook (Fig. 3a) Phase Components

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
1. Todd Phase				
a. Habitation Components				
Birdshead Cave E, D, C	Bla	1	6:h79	Wheeler 1958: Part III
Boysen Reservoir				
48FR2	Bla	1	6:h77	Wheeler 1958: Part III
48FR23	Bla	1	6:h77	Wheeler 1958: Part III
48FR33	Bla	4	6:h77	Mulloy 1954b
48FR34 Upper	Bla	1	6:h77	Wheeler 1958: Part III
48FR59	Bla	1	6:h77	Mulloy 1954b
48FR81	Bla	1	6:h77	Wheeler 1958: Part III
48FR89	Bla	1	6:h77	Wheeler 1958: Part III
Hutcheson-Davis	Bla	1	6:h76	Fremont County Archaeological Society 1967
Mangus III	C	5	6:h81	W. Husted Pers. Comm. 1968

Table 10 Continued

Site/Component	Data Index	Strat Index	Figure Reference	Source Reference
Mummy Cave Layer 36	C	5	6:h80	Wedel, Husted and Moss 1968
Wedding of the Waters Level III	Bla	1	6:h78	Frison 1962
b. Burial Components				
Turk	Bla	1	6:h89	Grey 1963
2. Willowbrook Phase				
a. Habitation Components				
Magic Mountain Zone B (impart) and C	Bla	2	3:91	Irwin-Williams and Irwin 1967
LoDaisKa C	Bla	3	3:a3	Irwin and Irwin 1958
Willowbrook Level 2	Bla	1	3:a2	Leach 1966
b. Burial Components				
Magic Mountain Zone B	Bla	1	3:a1	Irwin-Williams and Irwin 1966
Magic Mountain Zone C	Bla	1	3:a1	Irwin-Williams and Irwin 1966

Table 11 Hanna Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
McKean Level 1	C-715	1137 B.C. ± 600	Charcoal	Libby 1955: 123-124
Mortlach Thunder Creek	S-2[1]	830 B.C. ± 200	Bone	Deevey, Flint, and Rouse 1967: 137 McCallum 1955: 34
Tramp Deep Level 1	I-1310	1010 B.C. ± 125	Charcoal	Buckley, Trautman, and Willis 1968: 282
Long Creek Level 5 Upper	S-63A	1420 B.C. ± 115	Charcoal	McCallum and Wittenberg 1962: 75
Level 5 Lower	S-63B[2]	2570 B.C. ± 170	Charcoal	McCallum and Wittenberg 1962: 75

[1]Date unacceptable--solid carbon method.
[2]Date unacceptable, probably from earlier level. Date not graphed.

Table 12 Pelican Lake Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Glendo Subphase				
Cedar Canyon				
SX101	C-930[1]	725 B.C. ± 280	Charcoal	Libby 1955: 110
SX101	C-931[1]	1150 B.C. ± 410	Charcoal	Libby 1955: 110
SX101	C-469[1]	43 B.C. ± 90	Charcoal	Libby 1955: 108
		429 B.C. ± 43		
SX107	C-822[1]	99 B.C. ± 180	Charcoal	Libby 1955: 109
Glendo				
48PL23	M-912	70 B.C. ± 200	Charcoal	Crane and Griffin 1961: 118
48PL24 Lower	I-599	A.D. 425 ± 130	Burned Bone	Mulloy 1965: 37-38
Happy Hollow				
Hearth 6	GAK-1302	220 B.C. ± 80	Charcoal	Steege 1967: 14
Hearth 7	GAK-884	730 B.C. ± 90	Charcoal	Steege 1967: 15

[1]Date unacceptable--solid carbon method.

Table 12 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Lance Creek	A-364	500 B.C. ± 75	Charcoal	Damon, Haynes, and Long 1964: 102
Signal Butte Level II	L-385A	680 B.C. ± 100	Charcoal	Olson and Broecker 1961: 170
Uhl Site Zone E	GX0320	5 B.C. ± 95	Charcoal	J. J. Wood 1967: 593
	GX0321	220 B.C. ± 160	Charcoal	J. J. Wood 1967: 593
	GX0322	145 B.C. ± 105	Collagen	J. J. Wood 1967: 593
	GX0323	60 B.C. ± 65	Charcoal	J. J. Wood 1967: 593
2. Badger Subphase				
Good Soldier	M-1080a	430 B.C. ± 150	Charcoal	Crane and Griffin 1962: 194
Sitting Crow	I-447	525 B.C. ± 150	Charcoal	Trautman 1963: 71
3. Upper Miles Subphase				
Upper Miles	GAK-1503	470 B.C. ± 110	Bone	Reeves Unpublished
4. Spring Creek Subphase				

Table 12 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Bottle Neck	SI-238	A.D. 440 ± 200	Charcoal	Long and Mielke 1967: 375
Muddy Creek				
48FR33	C-711[1]	1400 B.C. ± 250	Charcoal	Libby 1955: 124
48FR34	C-702[1]	1590 B.C. ± 220	Charcoal	Libby 1955: 124
Mummy Cave				
Layer 34	I-1075	100 B.C. ± 150		Wedel, Husted, and Moss 1968
Layer 32	I-1427	870 B.C. ± 135		Wedel, Husted, and Moss 1968
Poison Creek 48FR5	C-712[1]	1556 B.C. ± 220	Charcoal	Libby 1955: 124
Spring Creek		A.D. 225 ± 200	Charcoal	Frison 1965: 93
Ten Sleep	M-433	A.D. 225 ± 200	Charcoal	Crane and Griffin 1958a: 1102
Wedding of the Waters		A.D. 330 ± 200	Charcoal	Frison 1965: 93

[1]Date unacceptable--solid carbon method.

Table 12 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
5. Keaster Subphase				
Eagle Creek	WSU-369[1]	A.D. 720 ± 160	Charcoal	Chatters 1968: 493
Keaster Layer				
Layer 1	GAK-1355[1]	1370 B.C. ± 80	Charcoal	Reeves Unpublished
Layer 1	GX-1194	240 B.C. ± 95	Collagen	Reeves Unpublished
Layer 3	W-1366	A.D. 5 ± 250	Charcoal	Levin, Ives, Oman, and Rubin 1965: 384
Stark Lewis	GAK	A.D. 230 ± 80	Charcoal	S. W. Conner Pers. Comm.
6. Blue Slate Canyon Subphase				
DgPl-42				
Level 6	GX-1196	680 B.C. ± 80	Charcoal	Reeves Unpublished
Level 3	GX-1272	A.D. 605 ± 160	Collagen	Reeves Unpublished
7. Mortlach Subphase				

[1]Date unacceptable at 1 Sigma.

Table 12 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Head-Smashed-In Test A Layer 15 (0-6")	GS-1253	A.D. 25 ± 80	Collagen	Reeves Unpublished
Head-Smashed-In North Layer 8	GAK-1474	1090 B.C. ± 120	Bone	Reeves Unpublished
Old Women's Layer 25	S-91[1]	A.D. 110 ± 70	Burned Bone	McCallum and Wittenberg 1962: 76
Long Creek				
Level 4 Upper	S-49a	280 B.C. ± 100	Charcoal	McCullum and Wittenberg 1962: 75
Lower	S-49b[1]	1760 B.C. ± 70	Charcoal	McCallum and Wittenberg 1962: 75
Walter Felt Layer 15b	S-279	480 B.C. ± 90	Charcoal	McCallum and Wittenberg 1968: 376

[1]Date unacceptable--probably from earlier level. Date not on graph.

Table 13 Besant Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Burial Components				
Alkire	SI-310	A.D. 300 ± 200	Wood	Long and Mielke 1967: 371
Arpan	SI-311	A.D. 100 ± 90	Wood	Long and Mielke 1967: 370
Badhill	I-497	A.D. 90 ± 150	Wood	Trautman 1963: 73
Boundary Mound				
Mound 1	I-499	A.D. 410 ± 160	Wood	Trautman 1963: 72
Mound 2	I-498	A.D. 610 ± 150	Wood	Trautman 1963: 72
Mound 3	I-414[1]	250 B.C. ± 125	Charcoal	Trautman 1963: 72
Grover Hand				
Mound 1	SI-167[2]	A.D. 1300 ± 200	Charcoal	Long and Mielke 1967: 369

[1] Date unacceptable at 1 Sigma.
[2] Date unacceptable at 2 Sigma, see text p. 337.

Table 13 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Mound 2	SI-168	A.D. 310 ± 30	Wood	Long and Mielke 1967: 369
Mound 3	SI-48	A.D. 230 ± 75	Wood	Sigalove and Long 1964: 185
Swift Bird				
Mound 1	I-718	A.D. 125 ± 120		Neuman 1967b: 479
Mound 2	I-719	A.D. 350 ± 100		Neuman 1967b: 479
2. Habitation/Kill Components				
a. Middle Missouri				
Porcupine Creek	GAK-1505	A.D. 405 ± 80	Bone	Reeves Unpublished
b. Belle Fouche-Powder River				
Ruby Site 48CA-302	GX-1157	A.D. 280 ± 135	Charcoal	Reeves Unpublished
c. Upper Missouri				
Leavitt				

Table 13 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Bone Bed I	GX-147[1]	A.D. 1005 ± 120	Collagen	Krueger and Weeks 1965: 49
Bone Bed I	GX-1212	A.D. 770 ± 95	Collagen	Reeves Unpublished
Stellings	GAK-1504[2]	A.D. 1280 ± 200	Bone	Reeves Unpublished
Wahkpa Ch'ugn (24HL101)	GAK-1506	A.D. 880 ± 200	Bone	Reeves Unpublished
d. Saskatchewan Basin				
DlPk-3	GX-1189	A.D. 520 ± 105	Collagen	Reeves Unpublished
Kenney Layer				
Layer 6	GAK-1354	A.D. 490 ± 110	Bone	Reeves Unpublished
Layer 6	S-271[3]	A.D. 1250 ± 60	Charcoal	Reeves Unpublished
Layer 8	S-272	A.D. 350 ± 60	Charcoal	McCallum and Wittenberg 1968: 376

[1] Date unacceptable at 2 Sigma, see text p. 339.
[2] Date unacceptable at 1 Sigma, see text p. 339.
[3] Date unacceptable at 2 Sigma, see text p. 340.

Table 13 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Head-Smashed-In North Layer 3a	GX-1220[1]	A.D. 490 ± 90	Collagen	Unpublished
Morris Church	S-120[2]	A.D. 1170 ± 50	Charcoal	McCallum and Wittenberg 1962: 78
Mortlach				
Layer 4B	S-22[3]	A.D. 370 ± 159	Bone	McCallum 1955: 34
Layer 4E	S-28[3]	450 B.C. ± 173	Humus	McCallum 1955: 34
Muhlbach	GSC-696	A.D. 680 ± 150		Gruhn 1967
Old Women's Layer 17	S-90	A.D. 300 ± 60	Burned Bone	McCallum and Wittenberg 1962: 76
Walter Felt				
Layer 10	S-201	A.D. 415 ± 80	Charcoal	McCallum and Wittenberg 1968: 376

[1]Date unacceptable at 1 Sigma, see text p. 339.
[2]Date unacceptable at 2 Sigma, see text p. 340.
[3]Date unacceptable--solid carbon method.

Table 13 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Layer 10	S-260	A.D. 415 ± 90	Charcoal	McCallum and Wittenberg 1968: 376
Layer 13	S-200	A.D. 354 ± 70	Charcoal	McCallum and Wittenberg 1968: 376
e. Southwest Manitoba				
Calf Mountain	GX-1192	A.D. 845 ± 85	Collagen	Reeves Unpublished
Richards	GX-1193	A.D. 710 ± 130	Collagen	Reeves Unpublished

Table 14 Avonlea Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Burial Components				
PK Ranch	A-548	A.D. 1050 ± 240	Bone	Haynes, Damon, and Grey 1966: 18
2. Habitation/Kill Components				
a. Saskatchewan Basin				
Avonlea	S-45	A.D. 450 ± 100	Burned Bone	McCallum and Dyck 1960: 80
DlPk-3	GX-1190	A.D. 625 ± 120	Collagen	Reeves Unpublished
Garratt (EcNj-7)	S-	A.D. 500 ± 70		Watson 1968: 10
	S-	A.D. 670 ± 60		Watson 1968: 10
Gull Lake				
Layer 26	S-254	A.D. 660 ± 60	Charred Wood	McCallum and Wittenberg 1968: 375
Layer 31a	S-255	A.D. 210 ± 60	Charred Wood	McCallum and Wittenberg 1968: 375

Table 14 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Head-Smashed-In North Layer 2c	GX-1252	A.D. 305 ± 130	Collagen	Reeves Unpublished
Test X				
Layer 14	GX-1251	A.D. 620 ± 85	Collagen	Reeves Unpublished
Layer 15	GSC-983[1]	A.D. 940 ± 140	Burned Bone	Reeves Unpublished
Layer 19	GAK-1475	A.D. 90 ± 120	Bone	Reeves Unpublished
Layer 22	GX-1399[2]	A.D. 615 ± 95	Collagen	Reeves Unpublished
b. Upper Missouri				
Timber Ridge	GX-1195	A.D. 970 ± 110	Collagen	Reeves Unpublished

[1] Date unacceptable at 1 Sigma, see text p. 342.
[2] Date unacceptable at 2 Sigma, see text p. 342.

Table 15 Valley and Loseke Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Valley Habitation Components				
Schultz (Vy-1)	M-182[1]	1780 B.C. ± 300	Shell	Crane and Griffin 1958b: 1121
2. Loseke Burial Components				
Arp Mound	M-1421	A.D. 780 ± 200	Wood	Crane and Griffin 1968: 94
Kropp	I-496	A.D. 1000 ± 85	Charcoal	Trautman 1963: 73
Wheeler Bridge 39CH4	I-562	A.D. 720 ± 120	Wood	Trautman 1963: 71
White Swan 39CH9	I-561	A.D. 525 ± 110	Charcoal	Trautman 1963: 71
Old Quarry	I-446	A.D. 700 ± 100	Charcoal	Trautman 1963: 71
Sherman Park	I-744	A.D. 375 ± 180	Bone	Trautman 1964: 278
Side Hill	I-448	A.D. 750 ± 90	Charred Bone	Trautman 1963: 71
3. Loseke Habitation Components				
Arp				

[1]Date unacceptable, see text p. 344.

Table 15 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Feature No. 10	M-1415	A.D. 420 ± 120	Charcoal	Crane and Griffin 1968: 95
Feature No. 3	M-1417	A.D. 760 ± 120	Charcoal	Crane and Griffin 1968: 95
Feature No. 9	M-1414	A.D. 750 ± 110	Charcoal	Crane and Griffin 1968: 94
Feature No. 4	M-1420	A.D. 810 ± 120	Charcoal	Gant 1967
Tramp Deep				
Level 3	I-1309[1]	800 B.C. ± 210	Charcoal	Buckley, Trautman, and Willis 1968: 282
Level 2	I-1308[1]	710 B.C. ± 110	Charcoal	Buckley, Trautman, and Willis 1968: 281

[1]Date unacceptable, see text p. 345.

Table 16 Keith Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Burial Components				
Woodruff	C-928[1]	A.D. 607 ± 240	Charcoal	Libby 1955: 104
2. Habitation Components				
Massacre Canyon	M-181[2]	130 B.C. ± 250	Shell	Crane and Griffin 1958b: 1121
25FT18	SI-126	A.D. 370 ± 100	Charcoal	Long and Mielke 1966: 415
	M-841	A.D. 820 ± 200	Charcoal	Crane and Griffin 1960: 40
25RW28	SI-68	A.D. 530 ± 45	Charcoal	Long 1965: 246

[1] Date unacceptable, solid carbon method.
[2] Date unacceptable at 1 Sigma, see text p. 350.

Table 17 Parker and Ash Hollow Phase Radiocarbon Dates

Site/Component	Laboratory Nubmer	Date A. D. / B. C.	Material	Date Reference
1. Parker Burial Components				
Hazleton Heights	I-885	A.D. 645 ± 100	Bone	Buckles 1963: 31
Hutcheson	GXO[1]	A.D. 145 ± 105	Bone	Wade 1966: 80
Michaund A	GXO-529[1]	A.D. 150 ± 110		J. J. Wood 1967: 615
2. Parker Habitation Components				
Biggs	GXO-565	A.D. 550 ± 90	Collagen	J. J. Wood 1967: 615
Happy Hollow Hearth 5	GAK-1303	A.D. 680 ± 80	Charcoal	Steege 1967: 14
Kassler Quadrangle	W-289	A.D. 460 ± 160	Charcoal	Rubin and Suess 1956: 486
Kassler Quadrangle	W-290	A.D. 590 ± 200	Charcoal	Rubin and Suess 1956: 486
LoDaisKa				
43-52"	M-1003	A.D. 980 ± 150	Charcoal	Crane and Griffin 1962: 197
58-60"	M-1005	A.D. 800 ± 150	Charcoal	Crane and Griffin 1962: 197

[1]Date unacceptable at 1 Sigma, see text p. 351.

Table 17 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
40-50"	M-1002	A.D. 690 ± 150	Charcoal	Crane and Griffin 1962: 197
70-74"	M-1008	A.D. 800 ± 150	Charcoal	Crane and Griffin 1962: 197
Willow Brook Level 4	GXO-526	A.D. 660 ± 110	Charcoal	Leach 1966: 31
Uhl Zone D	GXO-319[1]	A.D. 195 ± 95	Charcoal	Wood 1967
3. Ash Hollow Habitation Components				
Kelso	M-637	A.D. 800 ± 200	Charcoal	Crane and Griffin 1960: 39
4. Graneros Phase				
Graneros	GXO-325	A.D. 450 ± 55		J. J. Wood 1967: 615

[1]Date unacceptable at 1 Sigma, see text p. 351.

Table 18 Patten Creek Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Glendo 48PL24 Upper	M-971	A.D. 625 ± 150	Charcoal	Crane and Griffin 1961: 118
Patten Creek	A-497[1]	A.D. 160 ± 180	Charcoal	Haynes, Damon, and Grey 1966: 16
	A-706[1]	950 B.C. ± 140	Charcoal	Haynes, Damon, and Grey 1966: 16

[1]Date unacceptable, see text p. 353.

Table 19 Todd Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Greene	SI-103	A.D. 670 ± 55	Charcoal	Long 1965: 250
Mangus	SI-99	A.D. 900 ± 70	Charcoal	Long 1965: 249
Mangus	SI-100	A.D. 880 ± 70	Charcoal	Long 1965: 249
Mummy Cave Layer 36	I-1009	A.D. 720 ± 110		Wedel, Husted, and Moss 1968
Sorenson	I-690	A.D. 640 ± 100		W. Husted, Pers. Comm.
Turk Burial	A-583[1]	A.D. 1280 ± 160	Bone	Haynes, Damon, and Grey 1966: 18

[1]Date unacceptable at 1 Sigma, see text p. 354.

Table 20 Willowbrook Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
LoDaisKa				
62-64"	M-1004[1]	1450 B.C. ± 200	Charcoal	Crane and Griffin 1962: 197
68-76"	M-1006	1200 B.C. ± 200	Charcoal	Crane and Griffin 1962: 197
Willow Brook				
Level 2	GXO-528[1]	90 B.C. ± 100	Charcoal	Leach 1966: 43
Level 3	GXO-527	265 B.C. ± 75	Charcoal	Leach 1966: 44

[1]Date unacceptable at 1 Sigma, see text p. 354.

Table 21 Early Old Women's Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Alberta Dates				
DlPk-2	GX-1191	A.D. 1280 ± 95	Charcoal	Reeves Unpublished
Head-Smashed-In Test Y Layer 4	GSC-992	A.D. 1270 ± 170	Bone	Reeves Unpublished
Old Women's Layer				
Layer 13 A5	S-87	A.D. 850 ± 80	Charcoal	McCallum and Dyck 1960: 79-80
Layer 13 B5	S-89	A.D. 930 ± 80	Burned Bone	McCallum and Dyck 1960: 79-80
2. Saskatchewan Dates				
Gull Lake Layer				
Layer 21	S-150	A.D. 785 ± 80	Charcoal	McCallum and Wittenberg 1962: 78
Layer 24d	S-149	A.D. 730 ± 80	Charcoal	McCallum and Wittenberg 1962: 78
Walter Felt Layer 7	S-202	A.D. 690 ± 70	Charcoal	McCallum and Wittenberg 1968: 376

Table 22 Upper Republican and Equivalent Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Kansas and Nebraska Upper Republican Dates				
14JW301	GAK-593	A.D. 910 ± 100	Charcoal	Kigoshi and Kobayashi 1966: 64-65
25FT13				
Feature 1	I-584	A.D. 1440 ± 100	Charcoal	Trautman 1963: 73
Feature 1	SI-87	A.D. 1020 ± 60	Post	Long 1965: 247
Feature 30	SI-88	A.D. 1010 ± 60	Wood	Long 1965: 247
25FT16				
House 2	I-583	A.D. 1235 ± 125	Wood	Trautman 1963: 73
Feature 8	SI-194	A.D. 1020 ± 80	Charred Wood	Long and Mielke 1966: 415
Feature 11	SI-195[1]	Modern	Charcoal	Long and Mielke 1966: 415
25FT17				
Feature 70	SI-73	A.D. 1130 ± 50	Post	Long 1965: 248

[1] Date unacceptable, not on graph.

Table 22 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Feature 70	SI-34[1]	A.D. 465 ± 65	Wood	Sigalove and Long 1964: 184
Feature 30	SI-32	A.D. 1120 ± 65	Post	Sigalove and Long 1964: 184
Feature 66	SI-36	A.D. 1085 ± 65	Wood	Sigalove and Long 1964: 184
Feature 90	SI-40	A.D. 1240 ± 65	Wood	Sigalove and Long 1964: 184
Feature 15	I-585	A.D. 1170 ± 125	Charcoal	Trautman 1963: 73
25FT32	M-1365[2]	A.D. 1385 ± 100	Charcoal	Crane and Griffin 1964: 11
25FT36				
Feature 3	SI-193	A.D. 1150 ± 100	Charcoal	Long and Mielke 1966: 415
Feature 9	SI-192	A.D. 1200 ± 80	Charred Wood	Long and Mielke 1967: 371

[1] Date unacceptable, not on graph.
[2] Date not on graph.

Table 22 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
25FT39	SI-56	A.D. 1200 ± 65	Post	Sigalove and Long 1964 184
House 2 (25FT39)	SI-196	A.D. 1280 ± 120	Wood	Long and Mielke 1966: 415
25FT70				
Feature 30	M-844[1]	A.D. 1450 ± 200	Charcoal	Crane and Griffin 1960: 41
Feature 4	SI-47	A.D. 1160 ± 65	Post	Sigalove and Long 1964: 184
Feature 4	SI-53	A.D. 1105 ± 65	Post	Sigalove and Long 1964: 184
	SI-50	A.D. 880 ± 70	Post	Sigalove and Long 1964: 184
Feature 2	SI-197	A.D. 690 ± 80	Charcoal	Long and Mielke 1966: 415
25HN36	I-641	A.D. 1075 ± 100		Neuman 1967b: 482
	I-642	A.D. 1200 ± 100		Neuman 1967b: 482

[1]Date not on graph.

Table 22 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Woods	M-113	A.D. 1170 ± 150	Charcoal	Crane 1956: 666
2. Colorado-Upper Republican				
Peavey	GXO-317	A.D. 1140 ± 125	Charcoal	J. J. Wood 1967: 623
	GXO-318	A.D. 805 ± 155	Charcoal	J. J. Wood 1967: 623
Biggs	GXO-567	A.D. 1215 ± 105	Collagen	J. J. Wood 1967: 623
	GXO-566	A.D. 1255 ± 110	Collagen	J. J. Wood 1967: 623
Uhl	GXO-324	A.D. 740 ± 220	Collagen	J. J. Wood 1967: 623
Happy Hollow Hearth 3	GAK-1304	A.D. 1070 ± 95	Charcoal	Steege 1967: 14
3. Franktown				
Kasper	GXO-560	A.D. 1290 ± 250		J. J. Wood 1967: 628
Jarre Creek	W-1018	A.D. 1050 ± 250	Charcoal	Ives, Levin, Robinson, and Ruben 1964: 52
Van Bibber		A.D. 900 ± 250		J. J. Wood 1967: 635
4. Wyoming Side Notch				
Glendo 48PL23	M-973	A.D. 925 ± 150	Charcoal	Crane and Griffin 1961: 118

Table 22 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Lee 48NA326		A.D. 930 ± 86	Charcoal	Randall 1963: 6

Table 23 Early Middle Missouri Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Over Phase (Focus)				
Arp Test 7 37"	M-1413	A.D. 1020 ± 110	Charcoal	Crane and Griffin 1968: 94
Arp Extension 3	M-1411[1]	A.D. 1160 ± 100	Charcoal	Crane and Griffin 1968: 94
Crow Creek	M-836	A.D. 1050 ± 200	Charcoal	Crane and Griffin 1959: 179
Pretty Head	SI-156[2]	A.D. 1430 ± 80	Wood	Long and Mielke 1967: 369
Swanson	M-839	A.D. 850 ± 250	Post	Crane and Griffin 1960: 40
2. Monroe Phase (Focus)				
Breeden	M-608	A.D. 710 ± 150	Charcoal	Crane and Griffin 1960: 39
3. Anderson Phase (Focus)				
Cattle Oiler				

[1]Date unacceptable, see text p. 346.
[2]Date not on graph.

Table 23 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Feature 40	SI-316	A.D. 970 ± 130	Post	Long and Mielke 1967: 370
Feature 90	SI-317	A.D. 1110 ± 100	Charcoal	Long and Mielke 1967: 371
Feature 85	SI-318	A.D. 1260 ± 140	Post	Long and Mielke 1967: 371
Dodd	M-843	A.D. 1150 ± 200	Post and Charcoal	Crane and Griffin 1960: 40-41
Fay Tolton	M-1082	A.D. 1090 ± 150	Post	Crane and Griffin 1962: 195
Jiggs Thompson	I-1186	A.D. 1280 ± 120		Neuman 1967b: 482
	I-1187	A.D. 1280 ± 120		Neuman 1967b: 482
Langdeau				
Feature 60	SI-51	A.D. 1000 ± 65	Charcoal	Sigalove and Long 1964: 185
Feature 58	SI-54	A.D. 1100 ± 55	Charcoal	Sigalove and Long 1964: 185
Feature 10	SI-57	A.D. 1140 ± 70	Charcoal	Sigalove and Long 1964: 184

Table 23 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
LaRoche	SI-105[1]	A.D. 1380 ± 100	Charred Bone	Beam 1965: 248
Sommers	SI-314[1]	A.D. 1400 ± 100	Post	Long and Mielke 1967: 370
	SI-315	A.D. 975 ± 185	Post	Long and Mielke 1967: 370
4. Fort Yates Phase				
Fire Heart Creek	SI-213	A.D. 1230 ± 80	Charred Wood	Long and Mielke 1966: 416
5. Thomas Riggs Phase (Focus)				
Thomas Riggs	M-838	A.D. 1220 ± 200	Charcoal	Crane and Griffin 1959: 179
Cheyenne River				
Feature 24	SI-15	A.D. 1150 ± 60	Post	Sigalove and Long 1964: 185
Feature 103 in Feature 34	SI-17	A.D. 1080 ± 60	Post	Sigalove and Long 1964: 185
	SI-118	A.D. 1080 ± 60	Post	Long 1965: 247

[1]Date not on graph.

Table 23 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
	M-840[1]	A.D. 1300 ± 200	Post	Crane and Griffin 1960: 40
Feature 5	SI-116	A.D. 1150 ± 60	Post	Long 1965: 247
	I-582[1]	A.D. 1600 ± 85	Post	Long 1965: 247
Feature 102 in Feature 34	SI-12	A.D. 920 ± 60	Post	Sigalove and Long 1964: 185
	SI-117	A.D. 1160 ± 60	Post	Long 1965: 247
	I-581	A.D. 1175 ± 125	Post	Trautman 1963: 71
Zimmerman	I-613	A.D. 1520 ± 95	Post	Trautman 1963: 72

[1]Date not on graph.

Table 24 Central Plains Phase Radiocarbon Dates

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
1. Smoky Hill Aspect				
14BT20	GAK-591	A.D. 1480 ± 80	Charcoal	Kigoshi and Kobayashi 1966: 64
14CY30	GAK-295	A.D. 1200 ± 120	Charcoal	Kigoshi, Lin, and Endo 1964: 203-204
Root	I-509	A.D. 975 ± 100	Charcoal	Trautman 1963: 73
2. Transitional Upper Republican-Nebraskan				
Coufal	M-835	A.D. 1130 ± 200	Charred Post	Crane and Griffin 1959: 178-179
Zesson	M-1366[1]	A.D. 1365 ± 100	Charcoal	Crane and Griffin 1964: 11
25FT54	SI-70[1]	A.D. 1310 ± 50	Wood	Long 1965: 246-247
3. Nebraskan Aspect				
Little Pony	I-693	A.D. 1200 ± 90		Neuman 1967b: 480

[1]Date not on graph.

Table 24 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Steinheimer	SI-212	A.D. 1210 ± 80	Charcoal (Post hole)	Long and Mielke 1966: 416
Stonebrook				
House 1	SI-210	A.D. 1280 ± 70	Post	Long and Mielke 1966: 417
House 2	SI-211	A.D. 900 ± 90	Charcoal	Long and Mielke 1966: 417
T. Davis	M-1367	A.D. 1245 ± 100	Charcoal	Crane and Griffin 1964: 11
25DK7	M-1073[1]	A.D. 1435 ± 75	Charcoal	Crane and Griffin 1963: 243-244
25DK7	M-1074	A.D. 1120 ± 75	Charcoal	Crane and Griffin 1963: 243-244
Budenbender	M-869	A.D. 1190 ± 150	Charcoal	Crane and Griffin 1960: 41
Millar				

[1]Date not on graph.

Table 24 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Feature 116	SI-230	A.D. 1030 ± 90	Charcoal	Long and Mielke 1966: 414-415
Feature 289	SI-231	A.D. 1180 ± 80	Charcoal	Long and Mielke 1966: 414-415
Feature 13	SI-232	A.D. 1540 ± 100	Beam	Long and Mielke 1966: 414-415
Schellenger	GAK-405	A.D. 1020 ± 150	Charcoal	Kogoshi and Kobayashi 1965: 15
Squaw Creek	M-1069[1]	A.D. 1560 ± 75	Charcoal	Crane and Griffin 1963: 244
14ML16	GAK-638	A.D. 1190 ± 90	Charcoal	Kigoshi and Kobayashi 1966: 66
14ML5	GAK-639	A.D. 1340 ± 100	Charcoal	Kigoshi and Kobayashi 1966: 66
14ML8	GAK-637	A.D. 1495 ± 90	Charred Beam	Kigoshi and Kobayashi 1966: 66
Slough Creek	GAK-298	A.D. 1560 ± 120	Charred Post	Kigoshi, Lin, and Endo 1964: 204

[1]Date not on graph.

Table 24 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
4. Mill Creek[1]				
Kimball Village				
Feature 4 (18" b.s.)	WIS-23	A.D. 1310 ± 80	Charred Popcorn	Bender, Bryson, and Baerreis 1965: 402
Feature 4 30-36"	WIS-22	A.D. 1010 ± 60	Charcoal	Bender, Bryson, and Baerreis 1965: 402
Feature 4 36-42"	WIS-31a	A.D. 1310 ± 90	Charred Wood	Bender, Bryson, and Baerreis 1965: 402
	WIS-31b	A.D. 1100 ± 100	Charred Wood	Bender, Bryson, and Baerreis 1965: 402
84-90"	WIS-32	A.D. 1230 ± 100	Charred Wood	Bender, Bryson, and Baerreis 1965: 402
	WIS- 19a	A.D. 1200 ± 90		Bender, Bryson, and Baerreis 1965: 402
	WIS-19b	A.D. 1000 ± 100	Charcoal	Bender, Bryson, and Baerreis 1965: 402

[1]Dates not on graph.

Table 24 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
	WIS-36	A.D. 1290 ± 100	Bone	Bender, Bryson, and Baerreis 1965: 402
Phipps 84-90"	M-1096	A.D. 1100 ± 100	Charcoal	Crane and Griffin 1965: 132
8-18"	WIS-26	A.D. 1350 ± 100	Charcoal	Bender, Bryson, and Baerreis 1965: 400
Phipps 48-52"	WIS-8	A.D. 950 ± 70	Charcoal	Bender, Bryson, and Baerreis 1965: 400
48-54"	WIS-10	A.D. 1050 ± 90	Charcoal	Bender, Bryson, and Baerreis 1965: 401
54-60"	WIS-13	A.D. 810 ± 100	Charcoal	Bender, Bryson, and Baerreis 1965: 401
59-61"	WIS-14	A.D. 1100 ± 90	Charcoal	Bender, Bryson, and Baerreis 1965: 401
60-64"	WIS-11	A.D. 990 ± 100	Charcoal	Bender, Bryson, and Baerreis 1965: 401
70"	WIS-9	A.D. 930 ± 80	Charcoal	Bender, Bryson, and Baerreis 1965: 401

Table 24 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Waterman Crossing	WIS-30	A.D. 1210 ± 90	Charcoal	Bender, Bryson, and Baerreis 1965: 403
Wittrock	M-1065	A.D. 1425 ± 150	Charcoal	Crane and Griffin 1962: 195
9" b.c.	WIS-51	A.D. 1510 ± 80	Charcoal	Bender, Bryson, and Baerreis 1966: 522
Feature 4 11"	WIS-20a	A.D. 1220 ± 90	Charcoal	Bender, Bryson, and Baerreis 1965: 401
	WIS-20b	A.D. 1250 ± 110	Charcoal	Bender, Bryson, and Baerreis 1965: 401
Feature 2 70"	WIS-16	A.D. 1260 ± 90	Charcoal	Bender, Bryson, and Baerreis 1965: 401
Feature 2 20"	WIS-34a	A.D. 1580 ± 100	Bone	Bender, Bryson, and Baerreis 1965: 401
	WIS-34b	A.D. 1400 ± 80	Bone	Bender, Bryson, and Baerreis 1965: 401
23-36"	WIS-28	A.D. 1220 ± 120	Charcoal	Bender, Bryson, and Baerreis 1965: 402

Table 24 Continued

Site/Component	Laboratory Number	Date A. D. / B. C.	Material	Date Reference
Feature 3 24"	WIS-24	A.D. 990 ± 100	Charcoal	Bender, Bryson, and Baerreis 1965: 402
Feature 3 24"	WIS-39	A.D. 970 ± 80	Bone	Bender, Bryson, and Baerreis 1965: 402

Table 25 Unacceptable Radiocarbon Dates at 1 Sigma

Site	Phase Association	Laboratory Number	Date	Reason Rejected
1. Dates outside 2 Sigma				
*Long Creek	Hanna	S-63b	2570 B.C. ± 170	Cataloging errors, check to S-63a from same level.
*Keaster	Pelican Lake	GAK- 1355	1370 B.C. ± 80	Check to GX-1194 and W-1366, obsidian hydration date.
*Old Women's	Pelican Lake	S-91	A.D. 110 ± 70	Check to GAK-1474 from equivalent level at Head-Smashed-In and obsidian hydration date.
*Long Creek	Pelican Lake	S-49b	1760 B.C. ± 150	Cataloging error, check to S-49a from same level.
*Grover Hand 1	Besant	SI-167	A.D. 1300 ± 200	Check to other mound dates.
Leavitt	Besant	GXO-147	A.D. 1005 ± 120	Check to GX-1212 from same level.
Stellings	Besant	GAK-1504	A.D. 1280 ± 200	Check to other Besant and Old Women's dates.
*Kenney	Besant	S-271	A.D. 1250 ± 60	Check to GAK-1354.

*Dates whose true value to be acceptable must lie outside their 3 Sigma range of error.

Table 25 Continued

Site	Phase Association	Laboratory Number	Date	Reason Rejected
Morris Church	Besant	S-120	A.D. 1170 ± 150	Check to other Besant and Old Women's dates.
*Head-Smashed-In	Avonlea	GX-1399	A.D. 615 ± 95	Check to GAK-1195 and GX-1252 from equivalent levels.
*Schultz	Valley	M-182	1780 B.C. ± 300	Outside range for phase.
*Tramp Deep	Loseke	I-	800 B.C. ± 210	Check to other Loseke dates.
*Tramp Deep	Loseke	I-1308	710 B.C. ± 110	Check to other Loseke dates.
2. Dates whose true value is accepted in the 2 Sigma range				
Muddy Creek	Pelican Lake	C-711	1400 B.C. ± 250	Too early check with other dates.
Muddy Creek	Pelican Lake	C-702	1590 B.C. ± 220	Too early check with other dates.
Poison Creek	Pelican Lake	C-712	1556 B.C. ± 220	Too early check with other dates.
Eagle Creek	Pelican Lake	WSU-369	A.D. 720 ± 160	Too late for phase termination.

*Dates whose true value to be acceptable must lie outside their 3 Sigma range of error.

Table 25 Continued

Site	Phase Association	Laboratory Number	Date	Reason Rejected
Boundary Mound	Besant	I-414	250 B.C. ± 125	Too early check with other dates.
24HL101	Besant	GAK-1506	A.D. 880 ± 200	Too late for assemblage.
PK Ranch	Avonlea	A-548	A.D. 1050 ± 200	Too late for phase in area.
Head-Smashed-In	Avonlea	GSC-983	A.D. 940 ± 140	Too late check to GX-1251.
Timber Ridge	Avonlea	GX-1194	A.D. 970 ± 110	Too late for phase in area.
Arp	Over	M-1413	A.D. 1020 ± 110	Too late check to other dates.
Arp	Loseke	M-1415	A.D. 420 ± 20	Too early check to other Arp dates.
Massacre Canyon	Keith	M-181	130 B.C. ± 250	Too early check to other Keith and Parker dates.
Hutcheson	Parker	GXO	A.D. 145 ± 105	Too early for phase see text.
Michaund A	Parker	GXO-529	A.D. 100 ± 110	Too early for phase see text.
Uhl	Parker	GXO-319	A.D. 195 ± 95	Too early for phase see text.
Turk	Todd	A-583	A.D. 1290 ± 160	Too late for phase check to other dates.

Table 25 Continued

Site	Phase Association	Laboratory Number	Date	Reason Rejected
3. Dates rejected for other reasons				
Head-Smashed-In	Besant	GX-1220	A.D. 490 ± 90	Check and application of Poloch-Golson test.
Arp		M-1411	A.D. 1160 ± 100	Composite sample.
Patten Creek	Patten Creek	A-497	A.D. 160 ± 180	Association with site is unknown.
Patten Creek	Patten Creek	A-706	950 B.C. ± 140	Association with site is unknown.
LoDaisKa	Willowbrook	M-1404	1450 B.C. ± 200	Stratigraphic position in relation to other dates.
Willowbrook	Willowbrook	GXO-528	90 B.C. ± 100	Stratigraphic position in relation to other dates.
4. Solid Carbon Dates				
McKean	Hanna	C-715	1337 B.C. ± 600	Solid Carbon
Mortlach	Hanna	S-2	830 B.C. ± 200	Solid Carbon
Cedar Canyon	Pelican Lake	C-930	725 B.C. ± 280	Solid Carbon

Table 25 Continued

Site	Phase Association	Laboratory Number	Date	Reason Rejected
Cedar Canyon	Pelican Lake	C-931	1150 B.C. ± 410	Solid Carbon
		C-469	43 B.C. ± 90	Solid Carbon
			429 B.C. ± 43	Solid Carbon
		C-822	99 B.C. ± 180	Solid Carbon
Muddy Creek		C-711	1400 B.C. ± 250	Solid Carbon
		C-702	1590 B.C. ± 220	Solid Carbon
Poison Creek		C-712	1556 B.C. ± 220	Solid Carbon
Mortlach	Besant	S-22	A.D. 370 ± 159	Solid Carbon
Woodruff	Keith	C928	A.D. 607 ± 240	Solid Carbon

Table 26 Besant Side Notched: Selected Metrics 24HL101*

Metric Data	N	S	X	Range
Length (mm.)	101	11.69	39.90	22.5-75.0
Width (mm.)	151	3.16	21.70	11.0-33.2
Thickness (mm.)	190	1.04	5.95	2.62-9.02
Base Width (mm.)	109	2.91	18.70	12.0-29.0
Notch Width (mm.)	132	1.55	7.07	3.5-10.3
Weight (gm.)	99	3.06	5.26	1.03-13.37

*Davis and Stallcop (1966: Table 1).

Table 27 Pelican Lake Corner Notched:

Selected Metrics 24PH401*

Metric Data	N	S	X	Range
Length (mm.)	60	9.28	40.16	25.0-73.0
Width (mm.)	73	3.55	24.49	14.0-20.0
Thickness (mm.)	87	.76	5.64	3.8-7.9
Base Width (mm.)	58	3.36	17.84	4.3-24.0
Notch Width (mm.)	69	.93	5.60	4.5-9.0
Weight (gm.)	49	2.74	5.59	1.8-16.4

*Davis and Stallcop (1966: Table 1).

Table 28 Timber Ridge Side Notched:

Selected Metrics 24BL101*

Metric Data	N	X	Range
Length (mm.)	217	26.0	57.3-13.0
Body Width (mm.)	217	13.9	25.3-9.5
Thickness (mm.)	217	3.0	6.0-1.3
Base Width (mm.)	217	13.0	22.0-8.0
Neck Width (mm.)	217	10.9	18.0-7.0
Notch Width (mm.)	217	3.3	7.0-1.8
Ht. Basal Width (mm.)	217	2.3	5.0-1.0
Weight (gm.)	217	1.01	6.8-0.3
Basal Concavity (mm.)	217	1.20	3.0-0.0

*Davis (1966: Table 3)

Table 29: Pelican Lake Phase: Lithic Artifact Distribution by Subphase and Component

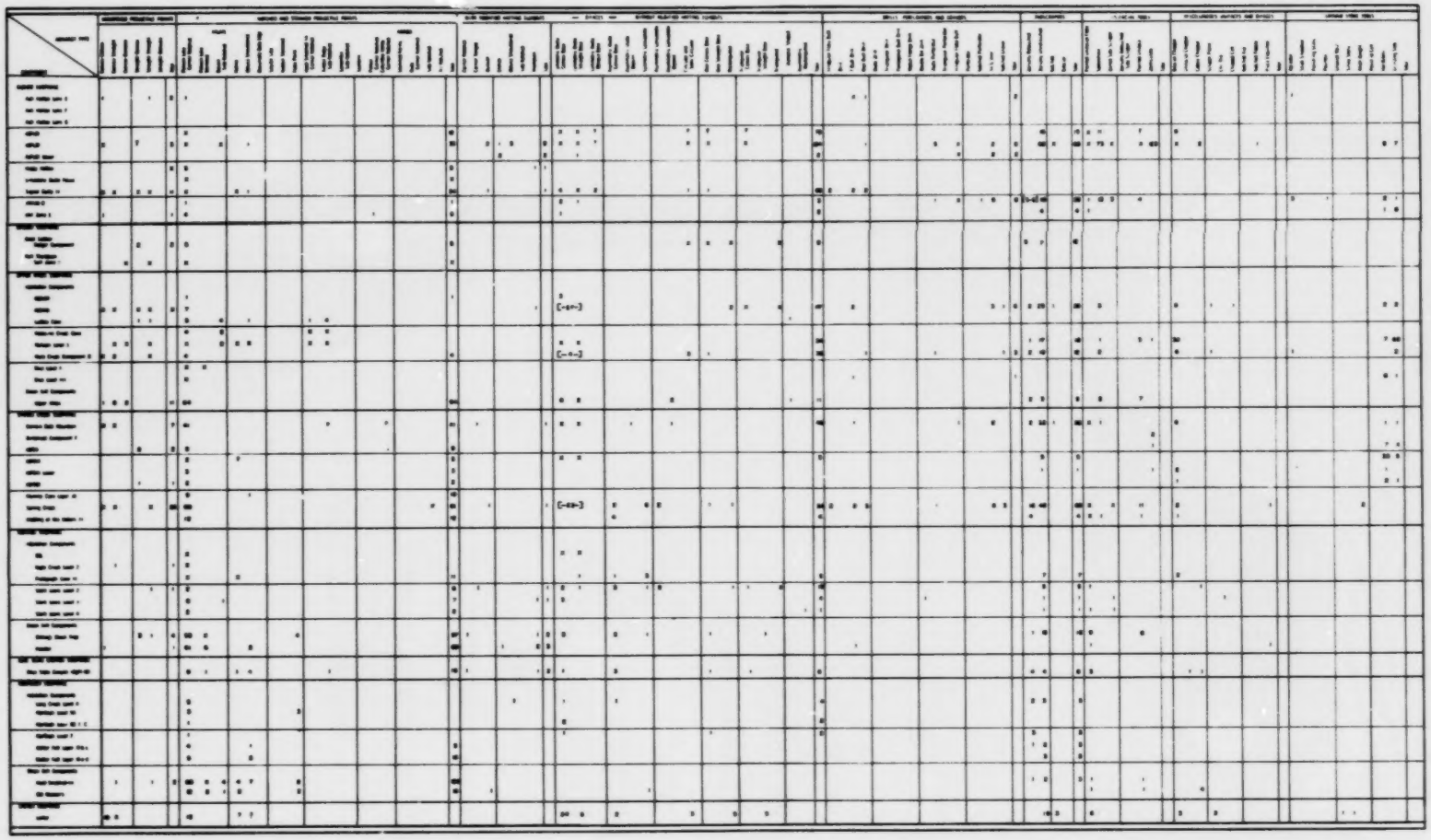

Table 30: Besant, Avonlea and Todd Phases: Lithic Distribution by Component

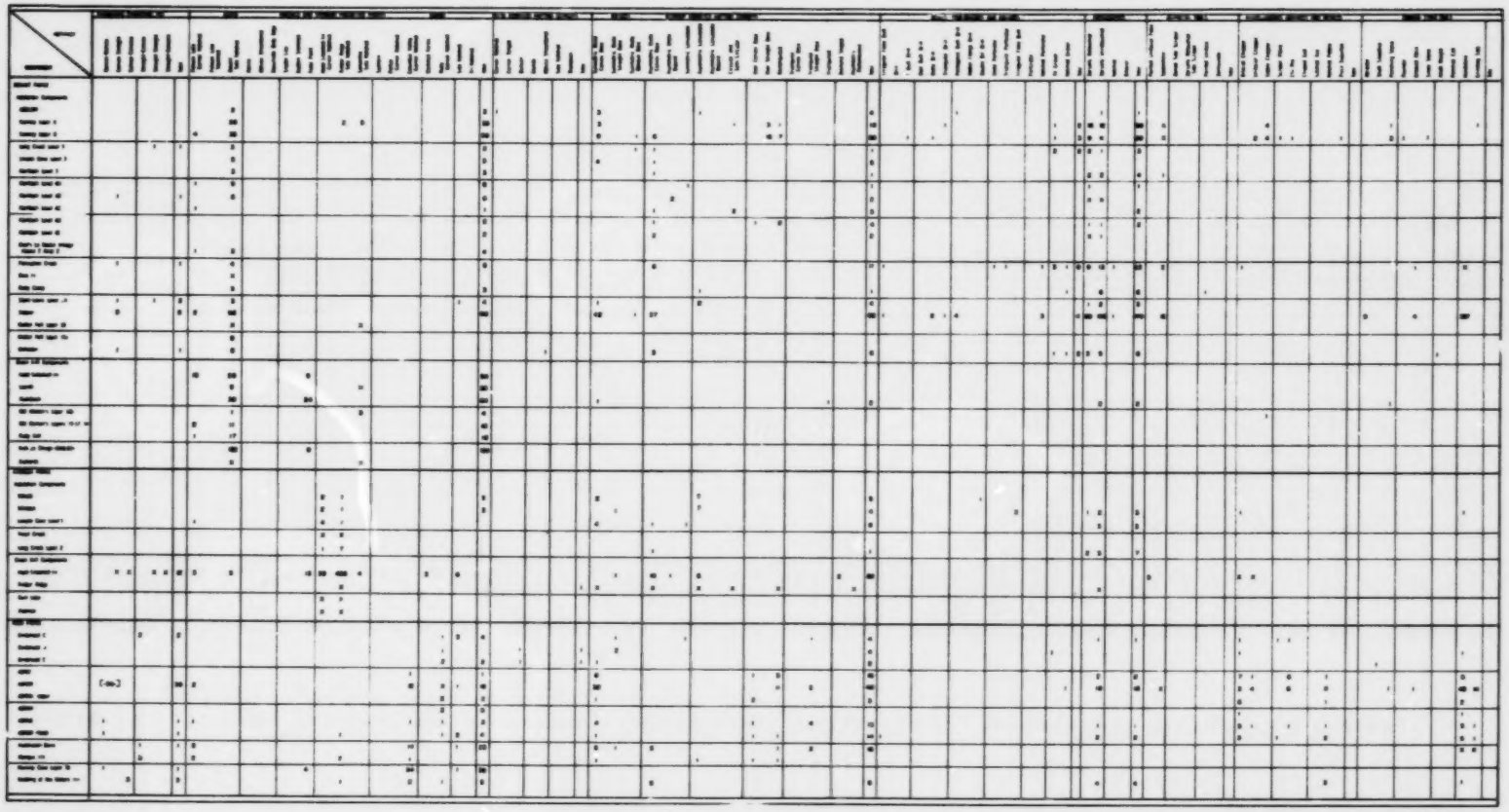

Table 31: Valley, Loseke, Keith, Parker, Ash Hollow, Patten Creek, Keyhole and Willowbrook Phases: Lithic Artifact Distributions

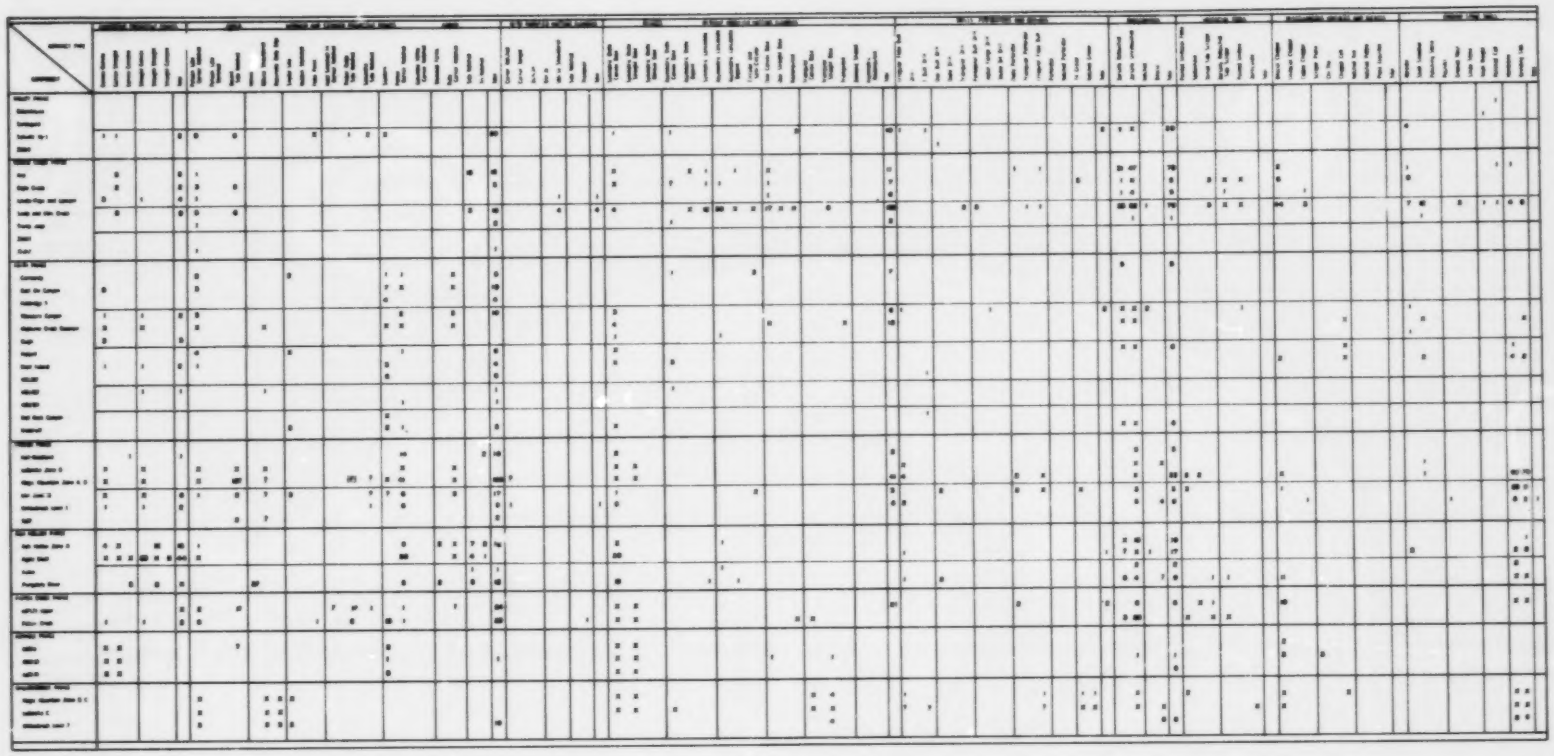

Table 32: Lithic Artifact System: Interphase Comparisons

Artifact Type / Phase	[illegible]	[illegible]	?	[illegible]	[illegible]	[illegible]	[illegible]	?	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	?
[illegible]	C C R	C R	F	R F R R R(1) R R	R(1)	R R R	R R R	C	F F R	R R(1) R	R R(1) R	R R R	R R R	
[illegible]	R	R	R	R F F	R C R	R(?)	R	R	C R	F R R	R R	R C C		
[illegible]	R R	R R	R	R R R	F F R R				R R	C R R	C R	R R		R
[illegible]	R R		R	F F R	R(1) R(2) R(2)				C	C		C		
[illegible]	R F	R(?)	C	F F	C		R		C	R R	C R	C R C	C	
[illegible]	C	C	F	C R R	F C C				F	C	R(1)	R	R	
[illegible]	C R(?)	C	F	R R R R	R R R C F R	R			C		R			
[illegible]	C R R	C C R	F	R R	R F R F R				C		R(1)			
[illegible]	C	C	C	C R(1)? R(?)	? R R F R R		R(1)		F F			R	R	
[illegible]	C C		C	R(?)					F F			R	R	
[illegible]	C C R	C	F	C R	R C F C		R		F R	C	R(?)	R C	C	
[illegible]	C			C R C C C					C C	R(1)			C C	

Artifact Type / Phase	[illegible]	[illegible]	[illegible]	[illegible]	?	[illegible]	[illegible]	?	[illegible]	[illegible]	?	[illegible]	[illegible]	[illegible]	?	[illegible]	[illegible]	?
[illegible]	C C C	R(?)	C C	R(1) C C		R F	R		C C C	C R		F R	R R(1)	R R		R R	R C C	
[illegible]	R R(1)	C C C	R R	R(1) C C		F F	R		C	R(1)		R R C	R R	R		R R	R R(?) R R	
[illegible]		R(?)	R			F F			R	R		C C						
[illegible]	R R R					? X										R	R R	
[illegible]		C C	R R	C		F F				C C R		C R				C C	R R R R C C	
[illegible]	C C	R(?)				F F	R(2)			R(1)		R	C			R C	C C	
[illegible]	R R		R R	C		E	R		R			R R				R	C C	
[illegible]	R					R F										R	R R C C	
[illegible]			R			R F			R C C	R		C					C C	
[illegible]						R F						C	C				? ?	
[illegible]	R(1)					E				R		F F	C F			[illegible]	F F	
[illegible]	R?		R			E	E		R	R		F R					F F	

Table 33: Pelican Lake Phase: Site and Habitation Feature Distribution

SETTLEMENT FEATURE / PHASE COMPONENT	SITE LOCATION					HABITATION FEATURES: STRUCTURES			CACHE PITS									EXCAVATED HEARTHS: Basin Shaped					Bucket Shaped				UNEXCAVATED HEARTHS						
	Cave Or Rock Shelter	Creek Or River Terrace	Butte Top	Prairie Level	High Altitude	Tipi Ring	Unexcavated House Floor	Excavated House Floor	Straight Sided Flat Bottom	Straight Sided Round Bottom	Bell Shaped	Basin Shaped	Irregular Form	Unknown Form	Total	Bone Uprights	Fire Broken Rock Piles	Rock Filled	Earth Filled	Stone Lined Rock Filled	Stone Lined Earth Filled	Stone Edged Earth Filled	Rock Filled	Earth Filled	Elbow Shaped	Irregular Roasting Pit	Rock Ringed	Rock Filled	Surface Burn	Ash Filled	Stone Platform	Stone Edged Stone Platform	Total
GLENDO SUBPHASE																																	
39FA36-B		X																2		1	1												4
Ash Hollow E, F, G	X																																
Cedar Canyon		X																X															
48PL21				X		X												X															
48PL23				X		X												5					1										6
48PL24 Lower		X				X												4					2				1						7
Happy Hollow	X																			2	1								3				6
Limestone Butte		X																X															
Signal Butte II			X						X									11	2			1											15
Uhl Zone E		X																5	2														7
BADGER SUBPHASE																																	
Good Soldier Badger Component		X																1	3														4
Fort Thompson Soil Zone 3				X														X															
UPPER MILES SUBPHASE																																	
48CK29		X																															
48CK39		X																															
48CK46		X																14			2		6								7		29
Ludlow Cave	X																																
McKean Level I		X																46					8			2							56
Medicine Creek Cave	X																																
Mule Creek Rockshelter	X																	9														5	14
Riva I & III		X																															
SPRING CREEK SUBPHASE																																	
Benzon-Bald Mountain					X																										2		2
Birdshead Cave F	X				X																								1				1
48FR5		X																3													2		5
48FR33		X																9											6		14		29
48FR35		X																													1		1
48FR34 Lower		X																1	1										20				22
Daugherty	X																																
48JO301	X																																
Mummy Cave Layers																																	
32 & 34	X																	X															
Spring Creek	X				X																	2											2
Ten Sleep	X				X																												
Wedding of the Waters II	X				X																								X				
KEASTER SUBPHASE																																	
BEL		X																X															
Eagle Creek Level 2		X																	X														
Pictograph Cave II	X																																
Stark Lewis Level 2		X																	X								X						
Stark Lewis Level 3		X																															
Stark Lewis Level 4		X																	X														
BLUE SLATE CANYON SUBPHASE																																	
DgPl-42		X																		1													
DgPl-47		X																															
MORTLACH SUBPHASE																																	
Head-Smashed-In Camp				X																1													
Mortlach Level 5A, B, C		X																															
Long Creek Level 4		X																															
Walter Felt Layers 13-15		X																															
LARTER SUBPHASE				X																													
Larter													1														1						

Table 34: Besant, Avonlea and Todd Phases: Site and Habitation Feature Distribution

COMPONENT / FEATURES	SITE LOCATION					HABITATION FEATURES: STRUCTURES			CACHE PITS									EXCAVATED HEARTHS: Basin Shaped					Bucket Shaped				UNEXCAVATED HEARTHS						
	Cave Or Rock Shelter	Creek Or River Terrace	Butte Top	Prairie Level	High Altitude	Tipi Ring	Unexcavated House Floor	Excavated House Floor	Straight Sided Flat Bottom	Straight Sided Round Bottom	Bell Shaped	Basin Shaped	Irregular Form	Unknown Form	Total	Bone Uprights	Fire Broken Rock Piles	Rock Filled	Earth Filled	Stone Lined Rock Filled	Stone Lined Earth Filled	Stone Edged Earth Filled	Rock Filled	Earth Filled	Elbow Shaped	Irregular Roasting Pit	Rock Ringed	Rock Filled	Surface Burn	Ash Filled	Stone Pattern	Stone Edged Stone Platform	Total
BESANT PHASE																																	
Avery		X																															
Burns Ranch		X														X																	
Calf Mountain				X																													
24HL101				X																													
48CK204				X																									X				
Kenney Layer 6		X				?							3				X		1										6				
Kenney Layer 6		X				?							1				X												7			5	
Krieger				X																													
Long Creek Level 3		X																															
Lissolo Cave	X																																
3VS10		X					1										X											1					
Mortlach 3.4		X					1																										
Porcupine Creek		X														X			3			1											
Rive II		X																															
Ruhr		X																															
Stark Lewis 1a		X																															
Stelzer		X														X													X				
Trout Creek		X																											X				
Walter Felt Layer 10 13a		X																															
Williston				X																													
United Cr.		X																															
AVONLEA PHASE																																	
Avery		X																															
Garratt		X																															
Head-Smashed-In Camp				X																													
39FA35		X																															
39FA39A		X																4	1	1			3										
Lissolo Cave Level 2	X																											X	X				
Long Creek Level 4		X																															
Mud Creek		X																															
Trout Creek		X																										X					
TODD PHASE																																	
Birdshead C	X																							1					3				
Birdshead D	X																												1				
Birdshead E	X																							3					4				
48FR2		X																													9		
48FR23		X																6			2				1				5		26		
48FR34 Upper		X																	1										30				
48FR59		X																															
48FR81		X																															
48FR89		X																1									2						
Hutcheson Dens	X																																
Aangus III	X																	X															
Mummy Cave Layer 36	X																																
Wedding of the Waters III	X				X																												

Table 35: Valley, Loseke, Keith, Parker, Ash Hollow, Patten Creek, Keyhole and Willowbrook Phases: Site and Habitation Feature Distribution

COMPONENT / PHASE	SITE LOCATION					HABITATION FEATURES																									
						STRUCTURES			CACHE PITS								EXCAVATED HEARTHS								UNEXCAVATED HEARTHS						
																	Basin Shaped				Bucket Shaped										
	Cave Or Rock Shelter	Creek Or River Terrace	Butte Top	Prairie Level	High Altitude	Tipi Ring	Unexcavated House Pit	Excavated House Floor	Straight Sided Flat Bottom	Straight Sided Round Bottom	Bell Shaped	Basin Shaped	Irregular Form	Unknown Form	Total	Bone Uprights	Fire Broken Rock Piles	Rock Filled	Earth Filled	Stone Lined Rock Filled	Stone Lined Earth Filled	Stone Edged Earth Filled	Rock Filled	Earth Filled	Elbow Shaped	Irregular Running Pit	Rock Ringed	Rock Filled	Surface Burn	Ash Filled	Stone Platform	Stone Edged Stone Platform	Total
VALLEY PHASE																																	
Schultz Valley		X						10			1	4	1																7			
Sandpiper		X																															
25JK5 Zone 1		X																											2				
25JK5 Zone 2		X																											1				
25JK5 Zone 3		X																											2				
25JK6		X																											X				
LOSEKE CREEK PHASE																																	
Arp		X								5	3	10						9															
Loseke Creek		X						34	27	2								4					17					X	7				
Scale & Elm		X						3		1	1	9		16				1										X	X				
Arp Jaw		X																1															
Lake Creek		X								5																							
25JK		X																											8				
25JK2		X																											1				
KEITH PHASE																																	
Carmanda		X							2														17					X			1		
Calf Ck Canyon		X																															
Elm Creek		X																															
Jabcite Canyon		X						2	2																			X					
Jabcite Creek		X						X																				X					
High		X																															
Pulpit		X																															
Heifer		X																															
[illegible]		X																1															
[illegible]		X						X																									
[illegible]		X																															
[illegible]		X																X															
[illegible]		X																															
Red Cloud		X																															
Red Rock Canyon		X																															
PARKER PHASE																																	
High Bluffs	X																																
Hidden Hollow	X																																
Kansas Jawbone		X																															
Loseke	X																	1										6					
Sand Mountain Zone A		X																															
[illegible]		X																															
[illegible] Zone B		X																		1													
Willowbrook Level 1	X																4	1															
NDT		X															X																
ASH HOLLOW PHASE																																	
Ash Hollow 0	X																											X					
Again Bluff	X																2											X					
Kelso		X																										X					
Purgatory River	X																																
PATTEN CREEK PHASE																																	
48PL9 [illegible]		X				X											4					2											
Potter Creek		X															X																
KEYHOLE SUBPHASE																																	
46CK6			X																														
46CK10		X																															
46CK16		X																															
WILLOWBROOK PHASE																																	
Sand Mountain Zone C		X																								4							
Loseke C	X																									3							
Willowbrook Level 2	X																										2						

Table 36: Interphase Comparisons; Site and Habitation Data

PHASE \ COMPONENT	SITE LOCATION					HABITATION FEATURES: STRUCTURES			CACHE PITS									EXCAVATED HEARTHS: Basin Shaped					Bucket Shaped		UNEXCAVATED HEARTHS								
	Cave Or Rock Shelter	Creek Or River Terrace	Butte Top	Prairie Level	High Altitude	Tipi Ring	Unexcavated House Floor	Excavated House Floor	Straight Sided Flat Bottom	Straight Sided Round Bottom	Bell Shaped	Basin Shaped	Irregular Form	Unknown Form	Total	Bone Uprights	Fire Broken Rock Piles	Rock Filled	Earth Filled	Stone Lined Rock Filled	Stone Lined Earth Filled	Stone Edged Earth Filled	Rock Filled	Earth Filled	Elbow Shaped	Irregular Roasting Pit	Rock Ringed	Rock Filled	Surface Burn	Ash Filled	Stone Platform	Stone Edged Stone Platform	Total
PELICAN LAKE PHASE	X	X	X	X	X	X			R(1)				R(1)					F	C	R	R	R	C	R		R(2)	R(1)	R	C		F		
BESANT PHASE	X	X		X		X	X						R			C	R		R			R(1)						R	F		R		
AVONLEA PHASE	X	X		X		X												F	R	R			F					X	X				
VALLEY PHASE		X						X		C	R	F	R																	F			
LOSEKE CREEK PHASE		X						X		C	R	F		X					C					R(1)?					X	F			
KEITH PHASE		X						X	E										C					R(1)?					C			R(1)	
PARKER PHASE	X	X																F	R		R(1)									C			
ASH HOLLOW PHASE	X	X																F											F				
PATTEN CREEK PHASE		X				X												F						C									
KEYHOLE PHASE		X	X															?															
TODD PHASE	X	X			X													F	R		R			R	R(1)		R		F		F		
WILLOWBROOK PHASE	X	X																									R	F					

Table 37: Ceramic Systems: Interphase Comparisons

PHASE \ CERAMIC ATTRIBUTE	Temper	Surface Finish: Interior Corded	Surface Finish: Exterior Corded	Decoration Rim Exterior: Punctates-Bosses	Decoration Rim Exterior: Cord Wrapped Rod	Decoration Rim Exterior: Cord Impressed	Decoration Rim Exterior: Incised Lines	Decoration Rim Exterior: Trailed Lines	Decoration Rim Exterior: (other)	Decoration Lip: Cord Impressed	Decoration Lip: Punctates	Decoration Lip: Cord Wrapped Rod	Decoration Lip: Incised	Decoration Lip: (other)	Decoration Interior Lip Rim	Vessel Form: Lip	Vessel Form: Rim	Vessel Form: Neck	Vessel Form: Shoulder	Vessel Form: Base	
Besant Phase	F F	F F R R	R R R R F	C F F F F E F R R					R	C F			R	R	R	F F C C C	F R	E	E	E	[illegible]
Avonlea Phase	E	E	E	E E						E						E	E	E	E	E	
Valley Phase	F C R(1) R R	F R C C R	R F	C F F F F F R R R	R R		R R	R R		C	F F					F C C	C C F	E	F F	E	X (2)
Loseke Creek Phase	C F R(1) R R R	F R R F R		C F F F F F C F C	R R	F F C	R R	R R		C	C C	C C	C C	R(1) C R(1) R(3) R		C C C C C	C R C C	E	F F	F F	
Keith Phase Calcite Temper	E	E R	R R R F	F R(3) R(3)					R(2)	F R						R F R	F R	F C	E	E	X (1)
Keith Phase Grit Temper	F F	F R R R	R R F R F	F				R(3)	R(3)	R F						F R	F R R	F C	F C	F C	
Parker Phase	R F R	F F R R R	E	E						R F	R(3)					F C R R C	F R(3)	E	E	E	
Ash Hollow Phase	F R R	F C C R		E						C F				R	C	F C C R C	F R				

Table 38: Burial Systems: Interphase Components

Phase	Location	Form	Type of Burial	Sex Age	Position	Associated Grave Goods
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 39: Organic Artifact Distribution

TOOL TYPE / PHASE COMPONENT	AWLS					FLAKERS				FLESHERS			BEAMERS											PENDANTS			SHELL			BONE BEADS				
	Bird Bone	Long Bone	Antler	Mammal	Ulna	Splinter	Indeterminate	Punch	Antler Tine	Long Bone	Rib	Antler Hammer	Serrated	Unserrated	Scapula Hoe	Scapula	Rib	Humerus Handle	Rib Graver	Long Bone Scraper	Antler Wedge	Rib Shaft Branch	Quill Flattener	Perforated Bison Phalange	Scapula Knife	Perforated Bison Radius	Pottery Comb	Perforated Deer Cranium	Antler Tine	Bison Tooth	Other	Pendant	Dist Beads	Bead Blanks	Punch	Incised	Gaming Piece	Tinker	Other
PELICAN LAKE PHASE																																							
GLENDO SUBPHASE																																							
Ash Hollow Lens E						1																													4				
Ash Hollow Lens F						1																																	
[illegible] Level		1																																					
Signal Butte II							1				1																				2					2			
SPRING CREEK SUBPHASE																																							
Spring Creek		1	2		X	X										X	1	X	X	X												1	3	3					
Wedding of the Waters II																	1																						
KEASTER SUBPHASE																																							
Pictograph Cave II	1									1												1							1						5	1			
Stark Lewis Level 4												1																					1						
BLUE SLATE CANYON SUBPHASE																																							
48PI 42								1																															
MORTLACH SUBPHASE																																							
Mortlach Level 7						1																																	1
BESANT PHASE																																							
Kenney Layer 6				3		1		1															3												1				
Kenney Layer 5						3		3															3																
Long Creek Level 1																																	1						
Mortlach Level 1 4A																1															1				1				
Porcupine Creek				1		1		1							2																								
SIMS Lewis Level 4																																			1				
Singer							7			1			3																						2		1		3
AVONLEA PHASE																																							
39RA35							1					1																											
VALLEY PHASE																																							
Shultz Village	3			4									3		1	1								7	1	1	1	1				1			X				
25UR2																																							1
LOSEKE CREEK PHASE																																							
Arp										1					5																	X							
Scalp					3	5					3			1	1																	X	X	X	1				2
Loseke Creek									1																														
Tramp Jev.									3																														
KEITH PHASE																																							
Carmody												1																											
14CL302																																			X				
14RU302		1																				1																	
Massacre Canyon				1	1																	1													X				
Medicine Creek				X		X																			2							X	X	X	X	X			
Pollert							X																	2															
West Island																																			X				
PARKER PHASE																																							
LeDaux B				X		X																													X	X			
Magic Mountain Zone A				2		X			X																										X				
[illegible]							X																																
Agate Bluff																2														1					X	2			
Ash Hollow Lens D									2																										X				1
Reiso						1																																	
Purgatory River Shelter	1					6								2																	1		1		18				2
TOJO PHASE																																							
Bordshead C						1																													1				
Bordshead J						1																													2				
[illegible] Stem						X																													1				
Wedding of the Waters III							X	1	2							1																			X				
WILLOWBROOK PHASE																																							
Magic Mountain Zone C						X																													X				
LeDaux C						X			X	X																									X	X			

Table 40: Faunal Remains Distribution

PHASE COMPONENTS \ FAUNA	UNGULATES	CARNIVORES	LAGO-MORPHS	RODENTS	OTHER
PELICAN LAKE PHASE					
[illegible] SUBPHASE					X X X
Ash Hollow Lens E	2 2 -1-			X	X
Ash Hollow Lens F	2 2 -1-			X	X
Ash Hollow Lens G	2 2 -1-			X	
48PL[illegible]					X
48PL[illegible]				X	X
48PL24 Lower	⊥				X
Happy Hollow	2 3 1 4	X X	6	7 5	X
Signal Butte II	1 2	X		X	
[illegible] B	⊥				X
Unit Zone E	2 1	⊥ ⊥	X X	X X X X	X X X
[illegible] SUBPHASE					
[illegible] Badger Component	X		X	X	X
UPPER MILES SUBPHASE					
[illegible]	1 X? X?				
McKean Level I	1 2		X		X ⊥
Mule Creek Rockshelter	X? X?		⊥		X
SPRING CREEK SUBPHASE					
[illegible]	1 2 2				
Birdshead F	1 X? -2-	1	X X	⊥ ⊥ ⊥⊥	⊥
Mummy Cave					
Spring Creek	1 X X X X	X	X	X	X
Wedding of the Waters II	⊥ X ± ±		X	X X	X
KEASTER SUBPHASE					
Pictograph Cave II	1 3 2	X X	X X	X X X X	X
[illegible] SUBPHASE					
Long Creek Level 4	8	⊥ ⊥			⊥ ⊥
LARTER SUBPHASE					
Larter	1 X	⊥		⊥	X X X
BESANT PHASE					
Kenney Layer A	7 ±	⊥ ⊥			
Kenney Layer B	13 ⊥ ±	± 2		⊥	
Lozeau Cave	X				
Long Creek Level 3	⊥ ±		⊥	⊥	
Mortlach Level 4E	X				X
Porcupine	5 2			⊥	
[illegible]	43 2? 2 2?	5 2 3	⊥	⊥	X X X ⊥
United Church	X				X
AVONLEA PHASE					
Lozeau Cave	X				
Long Creek Level 2	5	⊥ ⊥ ⊥			1 X
[illegible] A					⊥
[illegible]			⊥	⊥ ⊥	X
[illegible] CREEK PHASE					
48PL24 Upper					X
VALLEY PHASE					
Schultz (Vy-1)	1 2	X X X	X X	X X X X	X X X
[illegible]	X				X
25DK5	X X				
LOSEKE CREEK PHASE					
Arp	1 3 -2-				X X
Eagle Creek	2 3 1				
[illegible] Creek	2 1				
[illegible] Creek	1 2	X X			X
Tramp Deep	1 -2-				
25DK3	⊥ 5				X
25DK2	X X				
KEITH PHASE					
[illegible]	2 +				X
Massacre Canyon	2 1 +				X
Medicine Creek	2 1 +				X
[illegible]	X				X
[illegible]	2 1 -2-	⊥ X ⊥ ⊥	X X	X	X
[illegible] Island	X -X-			X?	X
[illegible] PHASE					
LaBonte	2 3 +	⊥		X X	X
[illegible]	2 2 1	2	2		
Happy Hollow	2 3 1 4	X X	6	7 5	
Unit Zone D	2 1	X X ⊥	⊥ X X	1 2 X X	X X X
ASH HOLLOW PHASE					
Agate Bluff	1 3 2 6			5 4	
Ash Hollow Lens D	1 2 -2-	⊥	2 ⊥	X ⊥ X X	X X X X
[illegible]	2 17 12	X X X	X X	X X X X	X X X
Purgatory River Shelter	X X	X X	X X X	X X X	X X
TODD PHASE					
Birdshead Cave C	⊥ X ⊥ X		X X	X X	X
Birdshead Cave D	⊥ ⊥ ⊥ ±		X X	1	X
Birdshead Cave E	± ±		X X		X
[illegible]	X				
48PL[illegible] Upper	⊥				
Wedding of the Waters III	X		X	X	X
[illegible] PHASE					
LaBonte C	2 1 ⊥			X X X	X X

Table 41: Susistence and Settlement Systems: Interphase Comparisons

SUBSISTENCE ACTIVITY / PHASE	HUNTING											COLLECTING								CORN HORTICULTURE						SUBSISTENCE—SETTLEMENT TYPE			
	Bison			Kill Type			Small Ungulate and Other Mammal					Shell Fish			Plant														
	Marginal	Medial	Significant	Pounds	Traps	Jumps	Marginal	Medial	Significant	Plains	Mountains	Marginal	Medial	Significant	Marginal	Medial	Significant	Fowling	Fishing	Marginal	Medial	Significant	Possible	Probable	Definite	Generalized Nomadic Hunter-Gatherer	Generalized Nomadic Hunter-Gatherer Horticulturalist	Nomadic Communal Bison Hunters	Semi-sedentary Hunter-Gatherer Horticulturalist
PELICAN LAKE PHASE GLENDO SUBPHASE	X			X					X	X		X					X	X	?	X			X			X	?		
BADGER SUBPHASE			X				X			X		X			X													X	
UPPER MILES SUBPHASE		X		X	X			X		X			X			X				X			X			X	P		
SPRING CREEK SUBPHASE		X						X		X	X						X	X	?	X			X			X	?		
KEASTER SUBPHASE			X	X	X	X	X			X	X				X			X										X	
BLUE SLATE CANYON SUBPHASE			X	X	X		X				X				X				X									X	
MORTLACH SUBPHASE			X	X	X	X	X			X	X	X			X			X	X									X	
LARTER SUBPHASE			X	X	X		X			X					X			X	X									X	
BESANT PHASE			X	X	X	X	X			X		X			X			X	X									X	
AVONLEA PHASE			X	X	X	X	X			X					X			X	X									X	
VALLEY PHASE	X	X							X	X				X		X		X				X		X					X
LOSEKE CREEK PHASE	X	X							X	X				X		X		X	X			X			X				X
KEITH PHASE	X								X	X				X		X		X				X		X					X
PARKER PHASE	X								X	X	X						X	X				X			X		X		
ASH HOLLOW PHASE	X								X	X				X			X	X	X			X		X			X		
PATTEN CREEK PHASE	X								X	X		X					X										X		
KEYHOLE PHASE		X						X		X			X			X										X			
TODD PHASE		X						X		X	X						X	X	X	X			X			X	?		
WILLOWBROOK PHASE									X		X						X	X	X		X				X		X		

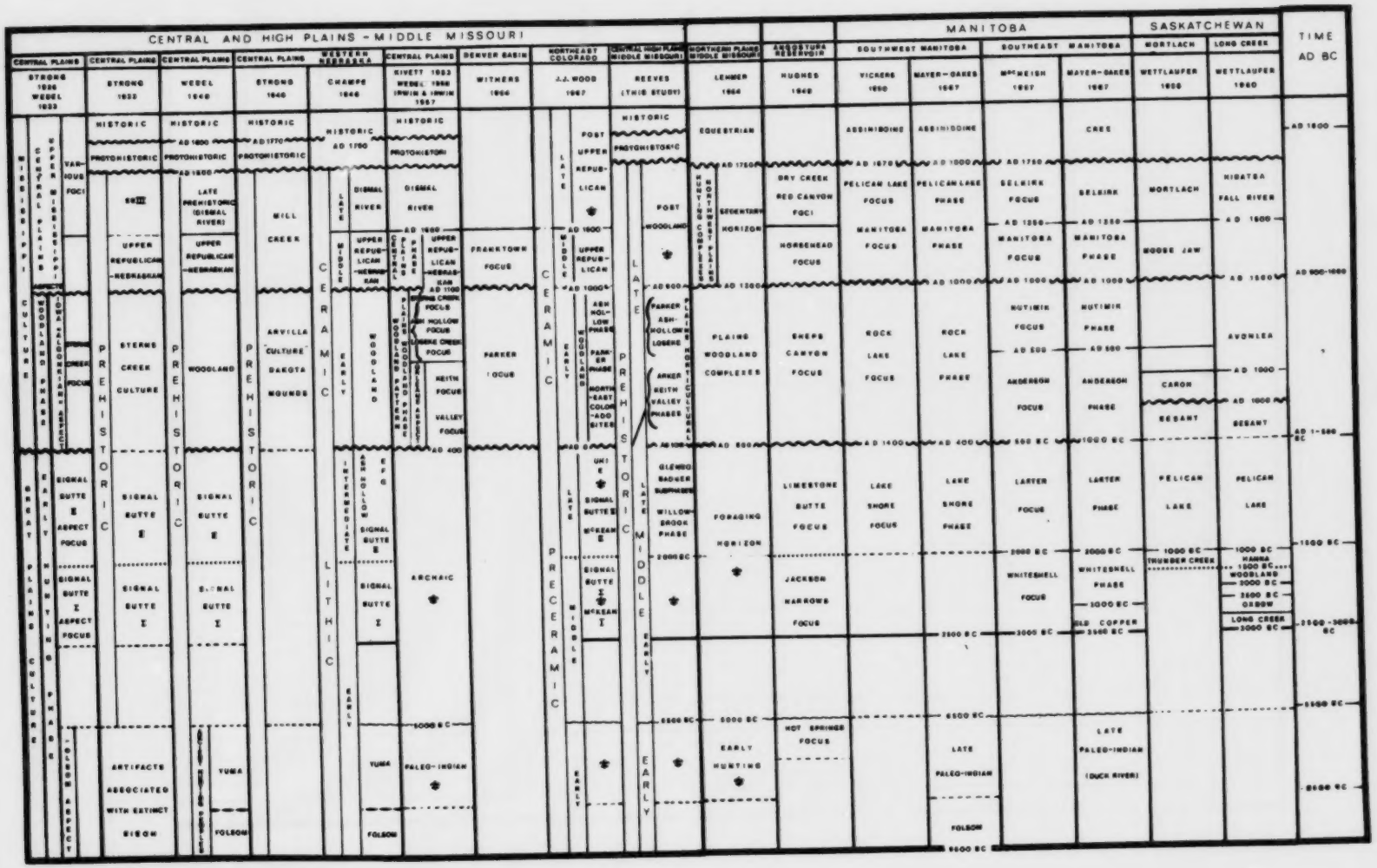

Figure 1: Classificatory schemes of the Northern Plains

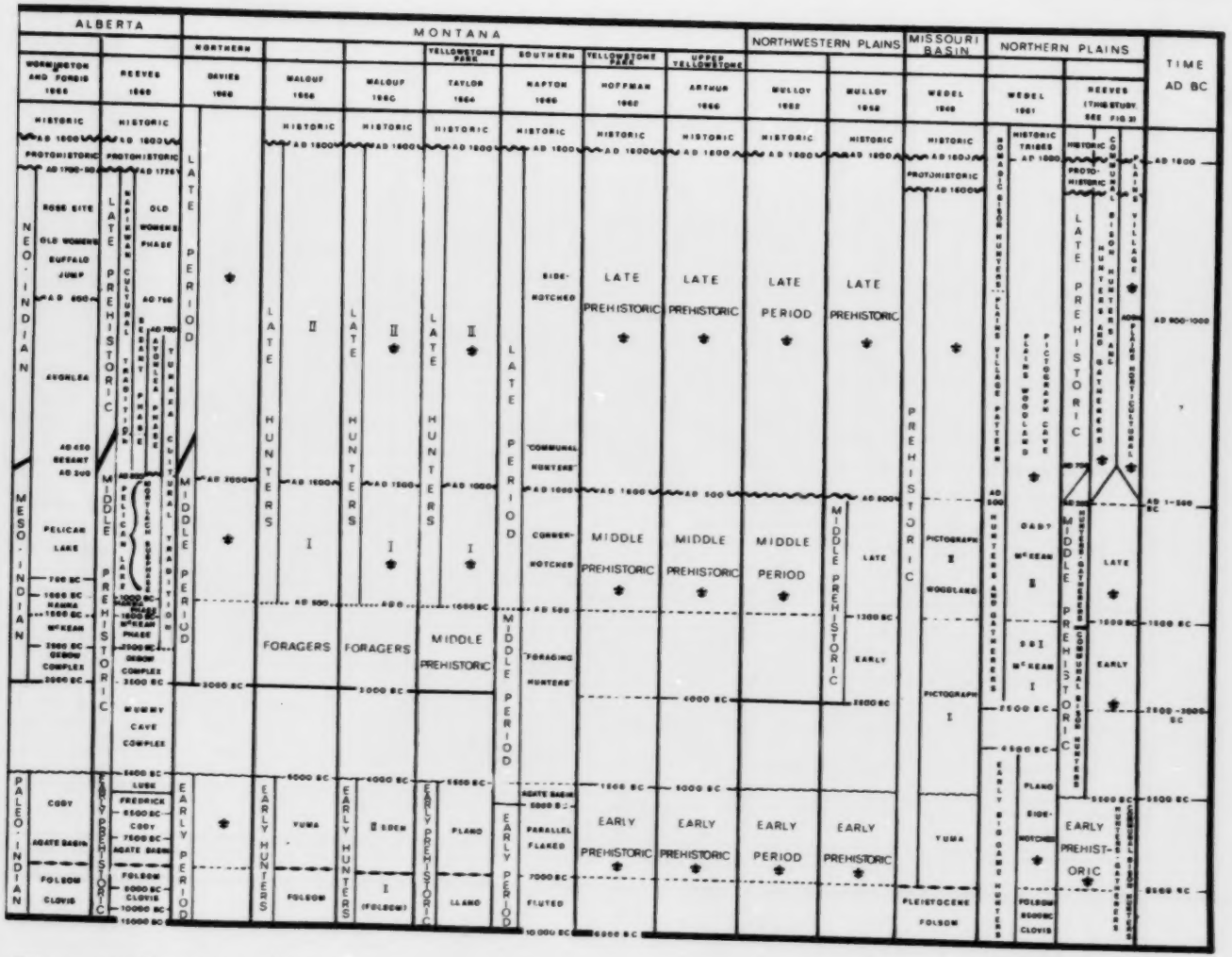

Figure 1 (continued)

CULTURAL TRADITION / PERIOD	TUNAXA●	NAPIKWAN●	PICOSA▲	UNNAMED			
				COLORADO PLAINS-FOOTHILLS	PLAINS HORTICULTURAL		BIG HORN AND SHOSHONE BASIN
					SOUTH NEBRASKA KANSAS	SOUTH DAKOTA NEBRASKA	
LATE PREHISTORIC	AVONLEA✱ KEYHOLE● PATTEN CREEK● REGIONAL PHASES	OLD WOMENS PHASE●		PARKER✱	KEITH✱	LOSEKE✱	TODD●
MIDDLE PREHISTORIC	PELICAN LAKE PHASE✱ (REGIONAL SUBPHASES: GLENDO● BADGER● UPPER MILES● SPRING CREEK● KEASTER● BLUE SLATE CANYON● MORTLACH● LANTER✱) HANNA PHASE□ McKEAN PHASE□	BESANT PHASE✱	WILLOWBROOK PHASE●			VALLEY✱	
TRADITION ORIGIN	INDIGENOUS PLAINS	INTRUSIVE FROM EASTERN FRINGE?	SOUTHWESTERN MOUNTAIN	DERIVED FROM PELICAN LAKE (GLENDO) AND WILLOWBROOK	DERIVED FROM PELICAN LAKE (BADGER?) & INFLUENCES FROM EASTERN WOODLANDS		INTRUSIVE FROM THE WEST

● NEW UNIT AND DEFINITION.

✱ REDEFINITION OF PREVIOUS UNIT.

□ REDEFINITION OF PREVIOUS UNIT NOT ANALYZED IN THIS STUDY.

▲ UNIT PROPOSED BY OTHER WORKER. DEFINITION RETAINED HEREIN.

Figure 2: Phases and Traditions Used in this Thesis

Figure 3: Pelican Lake and Willowbrook site locations

Willowbrook Phase

a1 Magic Mountain
a2 LoDaisKa
a3 Willowbrook

Glendo Subphase

b4 Witkin
b5 Gahagan Lipe
b6 Uhl
b7 Happy Hollow
b8 Ash Hollow
b9 Huffman
b10 Cedar Canyon
b11 Signal Butte
b12 Bisterfeldt
b13 Glendo Reservoir
48PL21
48PL23
48PL24
b14 Lance Creek
b15 Angostura Reservoir
39FA36
Limestone Butte
Focus

Badger Subphase

c16 Good Soldier
c17 Fort Thompson

Upper Miles Subphase

d18 Keyhole Reservoir
48CK29

Upper Miles Subphase cont.

48CK39
48CK46
d19 McKean
d20 Medicine Creek Cave
d21 Riva
d22 Ludlow Cave
d23 State Line
d24 Bentley
d25 Upper Miles
d26 Charlotte

Spring Creek Subphase

e27 Benzen-Bald Mountain
e28 Bottleneck Cave
e29 Mummy Cave
e30 Ten Sleep
e31 Daugherty
e32 Spring Creek
e33 Wedding of the Waters
e34 Boysen Reservoir
48FR5
48FR33
48FR34
e35 Birdshead Cave
e60 48J0301

Keaster Subphase

f36 Eagle Creek

Keaster Subphase cont.

f37 Emmigrant
f38 Pictograph Cave
f39 Billings Bison Trap
f40 Tibbits
f41 Glendive
f42 Adkins
f43 Ruffato
f44 Malta
f45 Keaster
f46 Carter Ferry
f47 Madison
f48 BEL
f49 Stark Lewis
f50 Round Up

Blue Slate Canyon Subphase

g51 DgP1-4, 42, 47
g52 Avon

Mortlach Subphase

h53 Head-Smashed-In
h54 Old Women's
h55 Mortlach
h56 Walter Felt
h57 Long Creek

Larter Subphase

i58 Larter
i59 Lockport

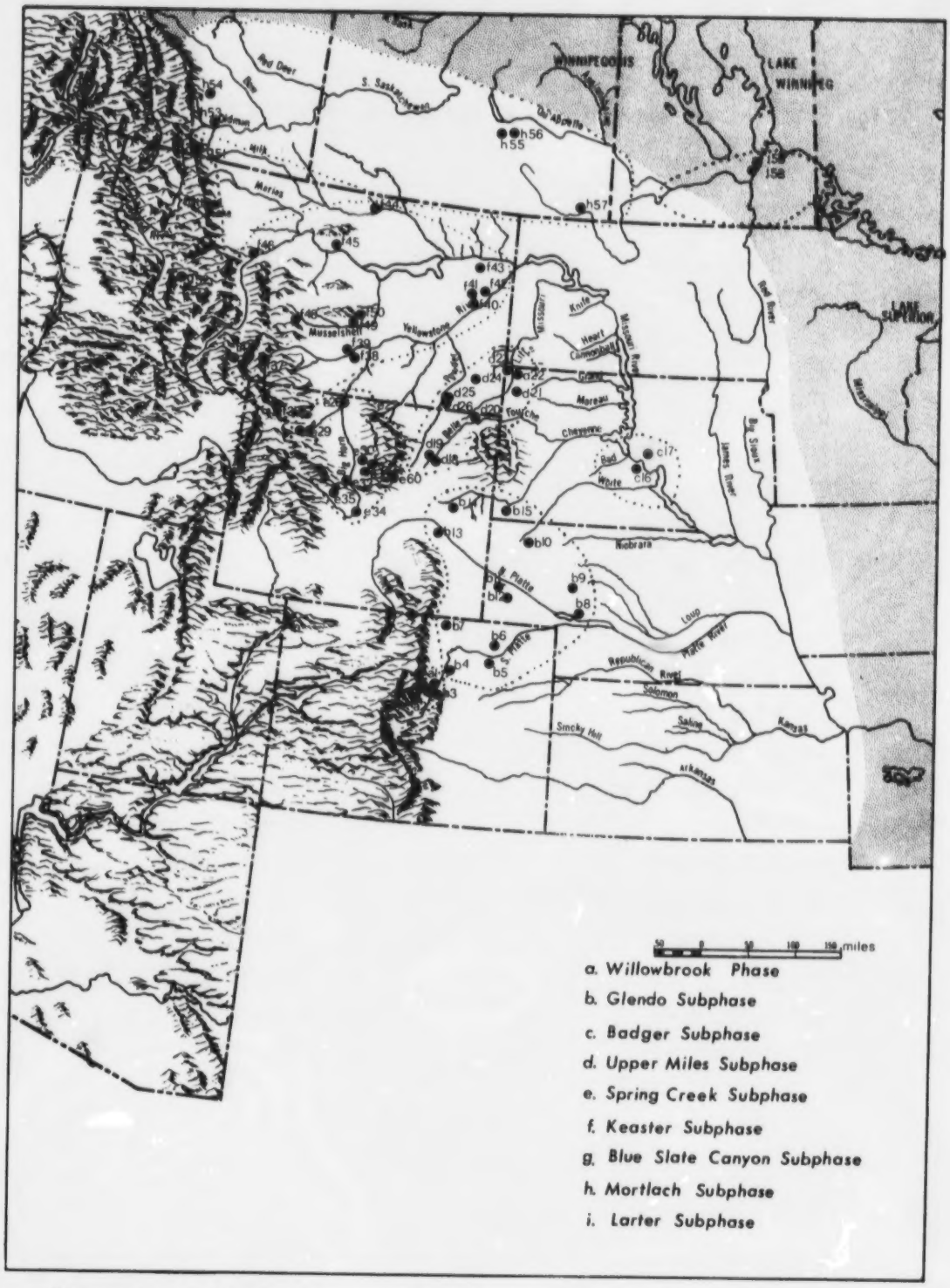

Figure 3: Pelican Lake and Willowbrook site locations.

Figure 4: Besant site locations for map on opposing page.

1	Mulbach	24	Grover Hand
2	Burns Ranch	25	Stelzer
3	Old Woman's	26	39ST9
4	Trout Creek	27	Ludlow Cave
5	Head-Smashed-In	28	Riva
6	Kenney	29	Medicine Creek
7	Morris Church	30	48CK209
8	Mortlach	31	McKean
9	Walter Felt	32	Ruby
10	Bakken-Wright	33	Lissolo Cave
11	Long Creek	34	Brockton
12	United Church	35	Stark Lewis
13	Kreiger	36	Round Up
14	Richards	37	Harlowton
15	Avery	38	Avon
16	Calf Mountain	39	Malta
17	Bald Hill	40	Agency
18	Williston	41	Wahkpa Chugn
19	Porcupine Creek	42	24HL103
20	Boundary	43	Stellings
21	Alkire	44	Dago Hill
22	Swift Bird	45	Maynard
23	Arpan	46	Leavitt

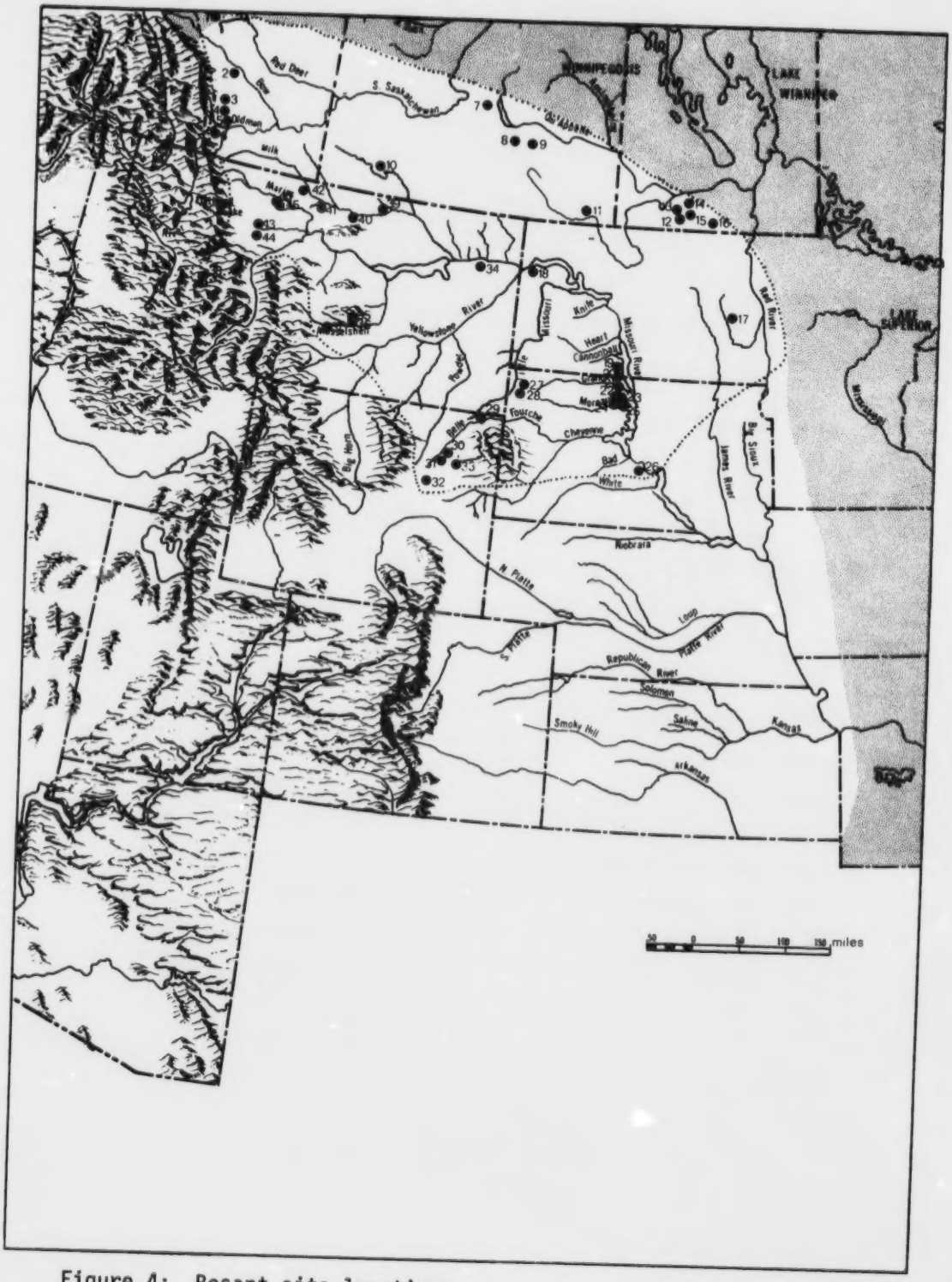

Figure 4: Besant site locations.

Figure 5: Avonlea site locations for map on opposing page.

1	Trout Creek	15	Lissolo Cave
2	Head-Smashed-In	16	McKean
3	Upper Kill	17	Leath
4	Verlo	18	Billy Creek
5	Gull Lake	19	PK
6	Bakken-Wright	20	Emmigrant
7	Garratt	21	Uhlm
8	Avonlea	22	Crawford
9	Cherry Lake	23	Big Badger
10	Long Creek	24	Reinhardt
11	Avery	25	Timber Ridge
12	Ludlow Cave	26	Mud Creek
13	Medicine Creek Cave	27	Three Buttes
14	Angostura Reservoir	28	Saco
	39FA35	29	Malta
	39FA36		

Figure 5: Avonlea site locations.

Figure 6: Keith, Parker Valley, Ash Hollow, Patten Creek, Keyhole, and Todd site locations

Keith Phase

a1 Pottorf
a2 Walter
a3 Elm Creek, Red Rock Canyon
a4 14CL302, 14RU302, 14RU303
a5 West Island
a6 Holdridge
a7 Guide Rock
a8 Red Cloud
a9 Flag Creek
a10 Woodruff
a11 Medicine Creek Reservoir
a12 25RW28
a13 Carmondy
a14 Ough
a29 Coil Oil Canyon
a30 Massacre Canyon

Parker Phase

b15 Biggs
b16 5L07, 5L08
b17 Uhl
b18 Howard Rollin
b20 Hutcheson
b21 Happy Hollow
b22 Hazleton Heights
b23 Michaund A
b24 LoDaisKa
b25 Magic Mountain
b26 Hall-Woodland
b27 Kassler Quadrangle
b28 Kassler Quadrangle
b37 Willowbrook
b44 Kasper, 5WL43, 5WL44, Hackberry Canyon, 5MH1
b47 Young

Valley Phase

c31 Leahy
c32 Christianson
c33 25D02
c34 25CD10, 25DK4, 25DK20, 25DK2
c35 25DX5
c36 25DX4
c38 25HT4
c39 Naper
c40 25CE4
c41 Dads Lake
c42 Schultz
c43 Sondegard
c45 Whalen
c46 Bakenhouse
e54 Loseke Creek Burial
e57 25HT8

Ash Hollow Phase

d19 Agate Bluff
d48 25CE6
d49 Kelso, 25CE5
d50 Hatch B
d51 Ash Hollow Cave
d52 25SF10
d53 Bisterfeldt

Loseke Creek Phase

e54 Loseke Creek
e55 25DK3
e56 25KX207
e57 Eagle Creek, 25KX8
e58 Scalp and Ellis
e59 Old Quarry
e60 Side Hill, Truman
e61 Arp
e62 Wheeler Bridge

Loseke Creek (continued)

e63 White Swan
e64 25KX6
e65 Tramp Deep
e66 Sherman Park
e85 Wolf Creek
c33 25DK5

Keyhole Phase

f67 48CK6
f68 McKean
f69 48CK10
f70 48CK35

Patten Creek Phase

g71 Patten Creek
g72 48PL24
g73 Silver Springs
g74 Mahoney
g75 Laramie

Todd Phase

h76 Hutcheson Davis
h77 Boysen Reservoir
48FR2
48FR23
48FR33
48FR34
48FR59
48FR81
48FR89
h78 Wedding of the Waters
h79 Birdshead
h80 Mummy Cave
h81 Mangus
h82 Turk

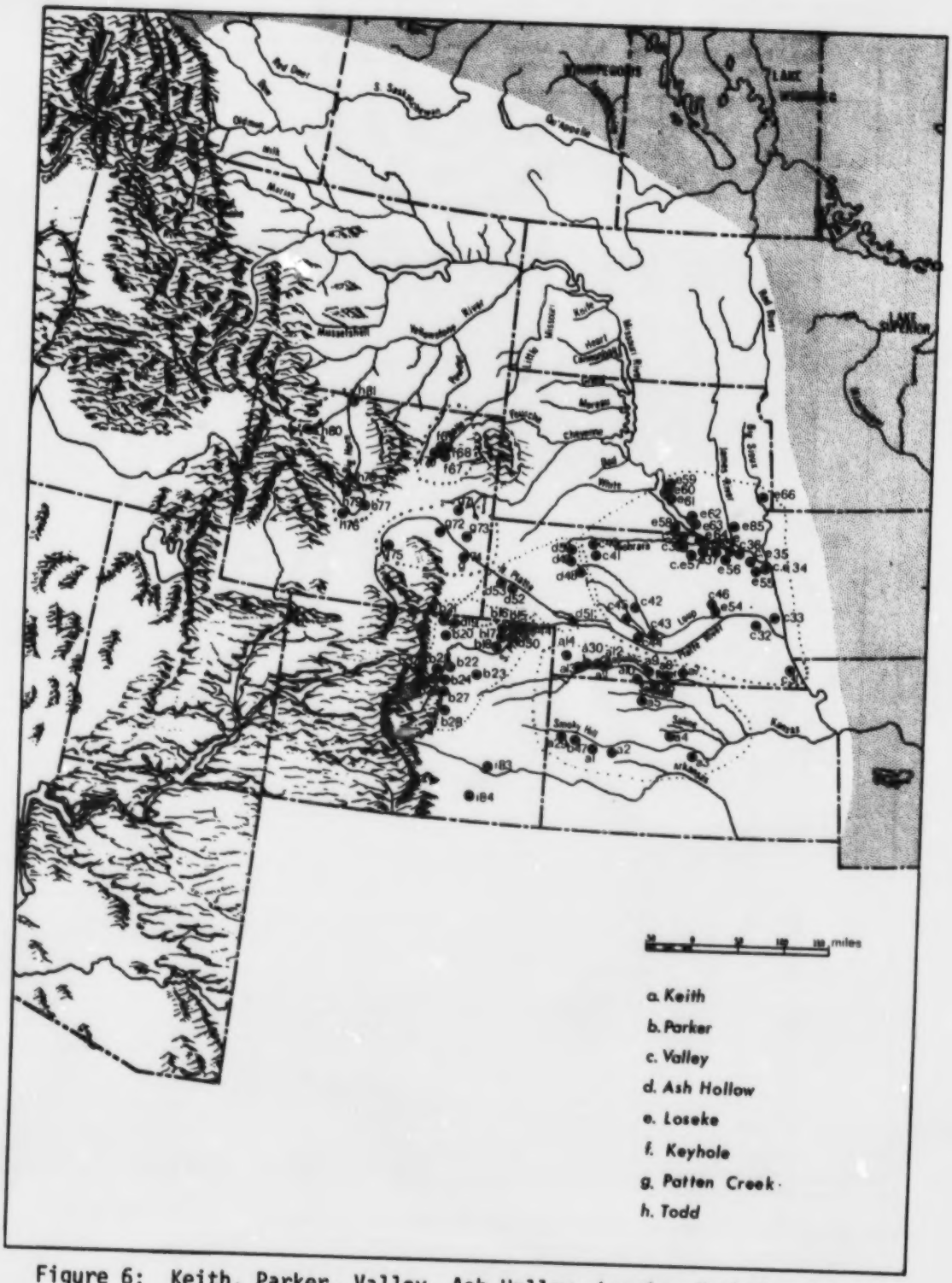

Figure 6: Keith, Parker, Valley, Ash Hollow, Loseke, Keyhole, Patten Creek and Todd site locations.

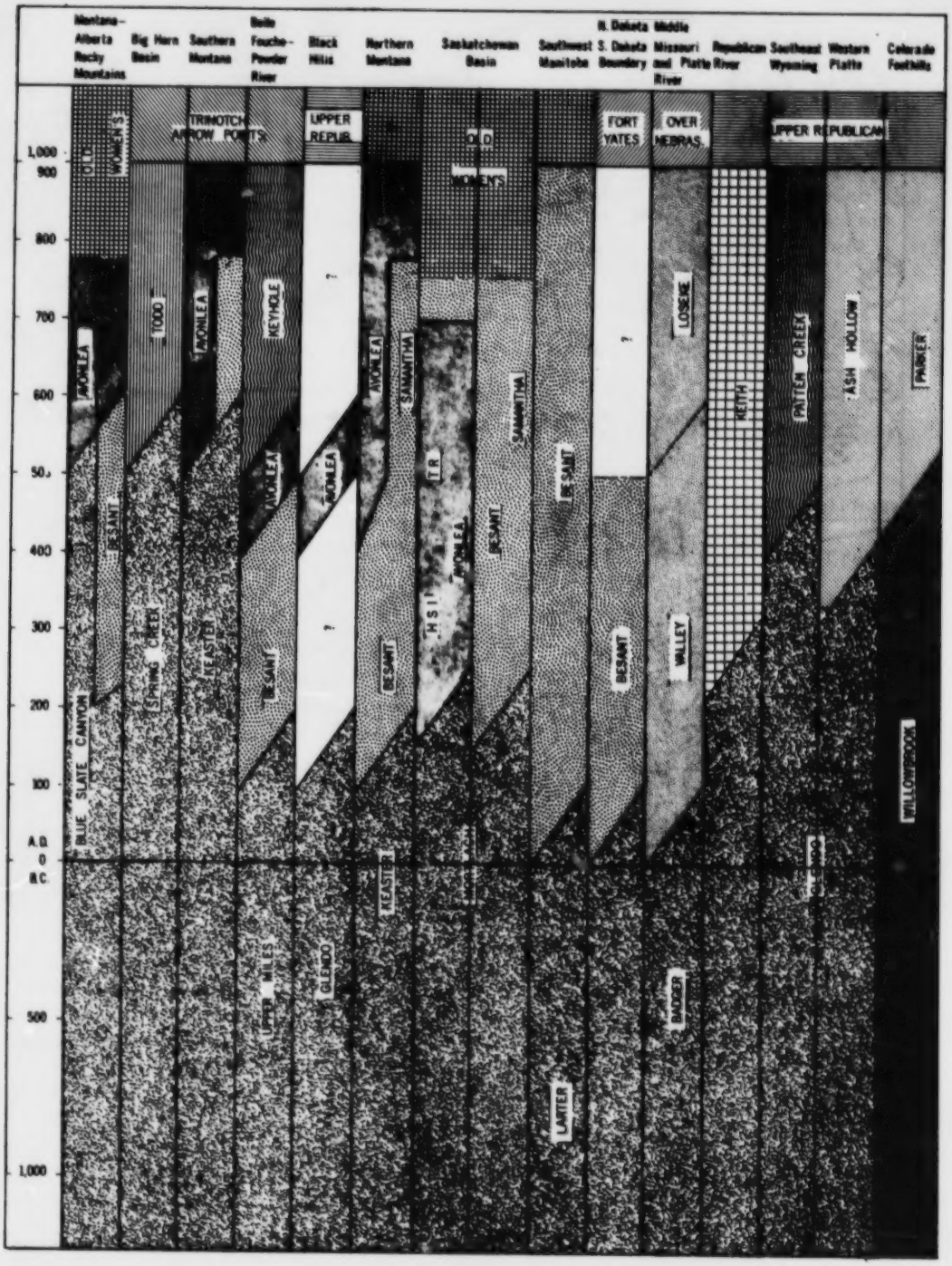

Fig. 7: Temporal position of the Phases

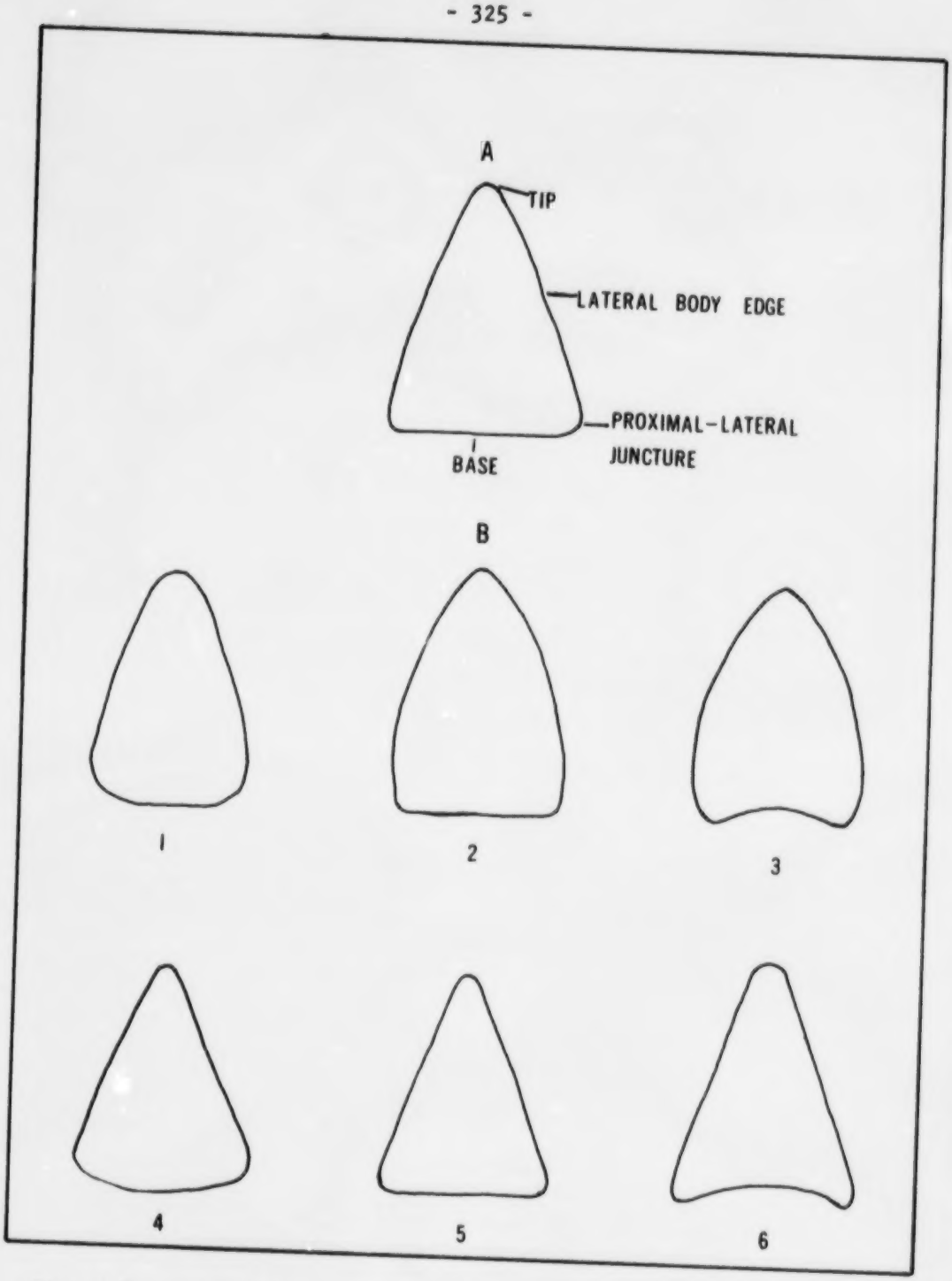

Figure 8: Unnotched point terminology and trial types; A, point terminology; B, trial types: 1, convex lateral edge-convex base; 2 and 3, convex lateral edge-straight base; 4, straight lateral edge-convex base; 5, straight lateral edge-straight base; 6, straight lateral edge-concave base.

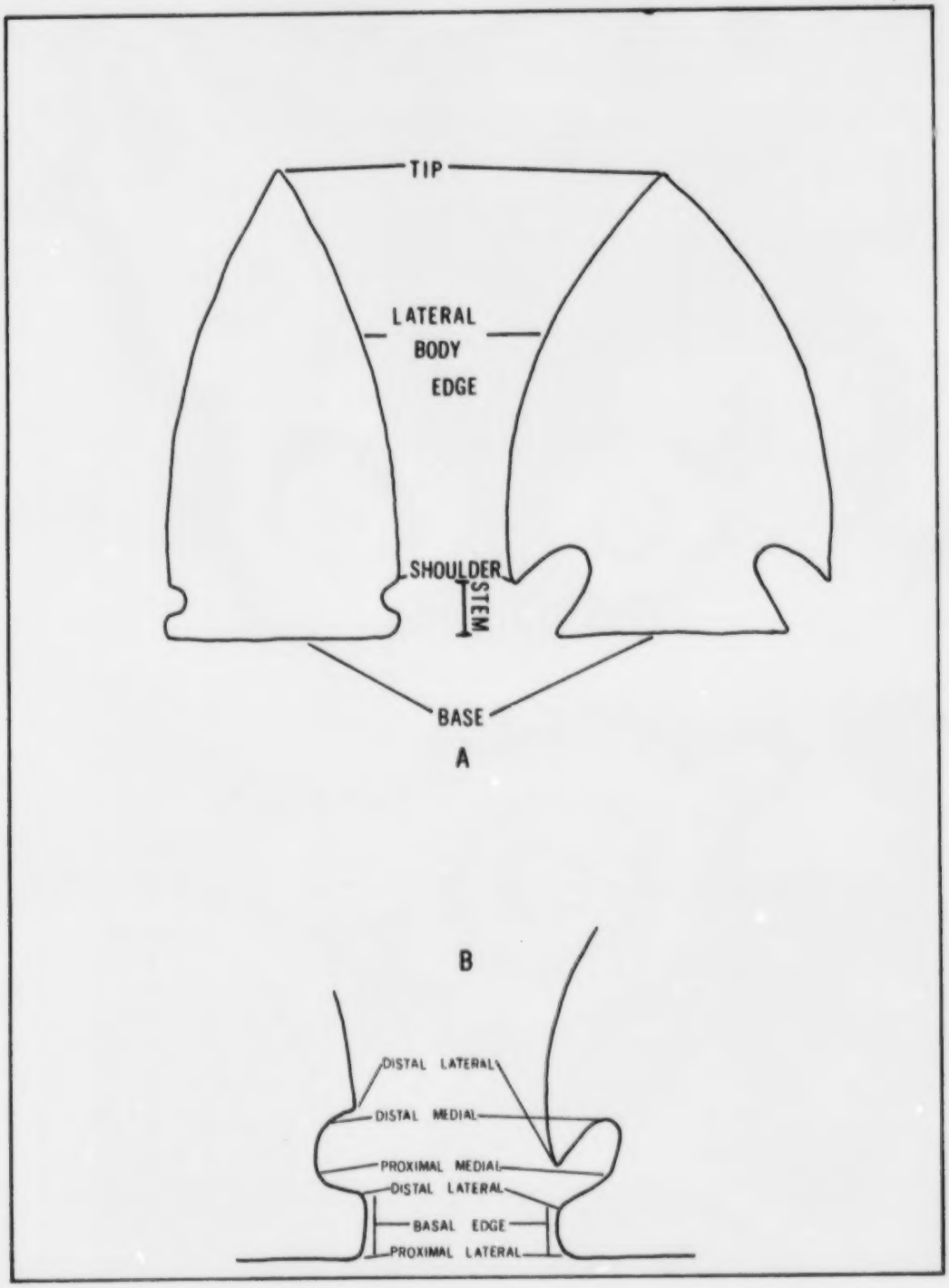

Figure 9: Notched point terminology: A, general attributes of side and corner notched points; B, attributes associated with the Haft Element.

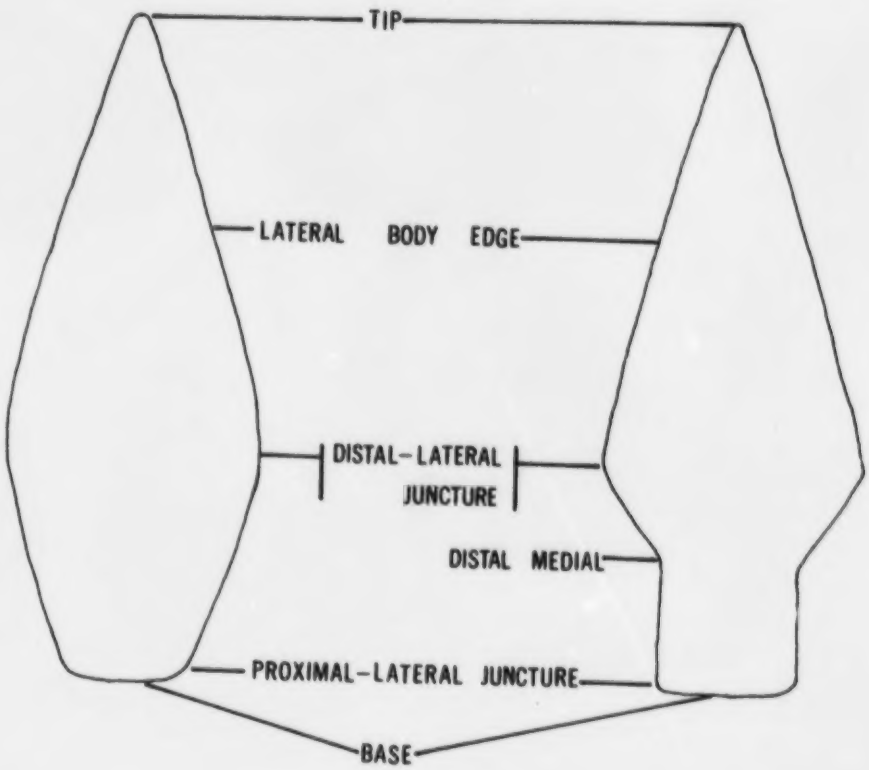

Figure 10: Stemmed point terminology: A, stemmed point without distal medial juncture; B, stemmed point with distal medial juncture.

Figure 11: Besant Side Notched projectile points.

Nos. 1-2	24HL101 (Nos. 112, 147)
Nos. 3-4	Old Women's (Nos. 91, 230)
No. 5	Kenney (No. 875)
Nos. 6-16	24HL101 (Nos. 117, 195, S17, 67, 142, 66, 98, 120, 151, 3, 44)
Nos. 17-20	Head-Smashed-In (Nos. 1259, 1629, 2059, 1756)

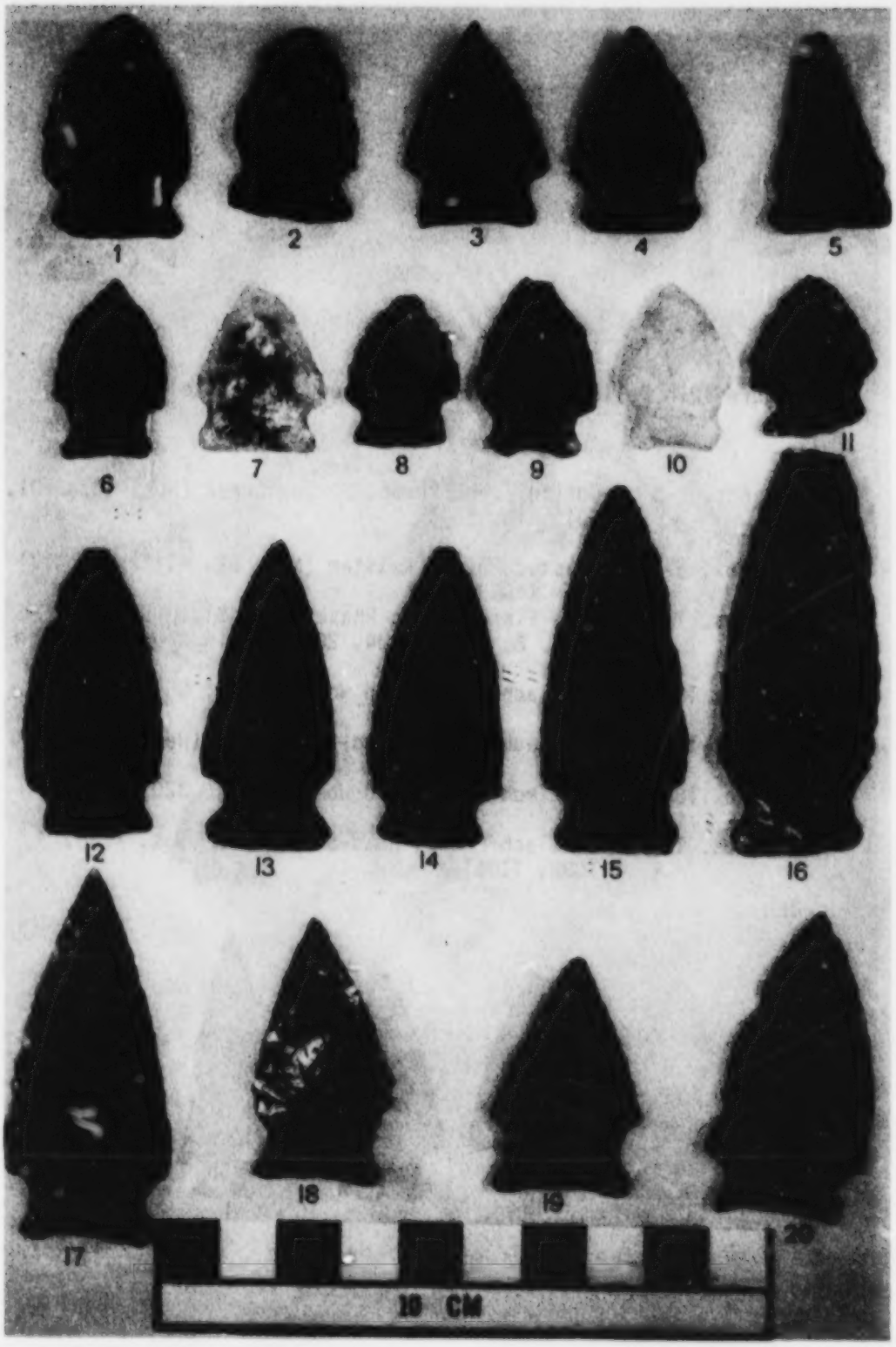

Figure 11: Besant Side Notched projectile points.

Figure 12: Pelican Lake Corner Notched projectile points.

Nos. 1-5	Spring Creek Phase, Spring Creek (Nos. 503, 501, 501, 503, 501)
Nos. 6-10	Keaster Phase, Keaster (Nos. 52, 9, 73, 20, 17)
Nos. 11-15	Blue Slate Canyon Phase, Blue Slate Canyon (Nos. 8, 16, 28, 24, 204)
No. 16	Mortlach Phase, Old Woman's (No. 90)
No. 17	Mortlach Phase, Head-Smashed-In (No. 1173)
No. 18	Mortlach Phase, Old Woman's (No. 320)
Nos. 19-21	Mortlach Phase, Head-Smashed-In (Nos. 1746, 1090, 1106)

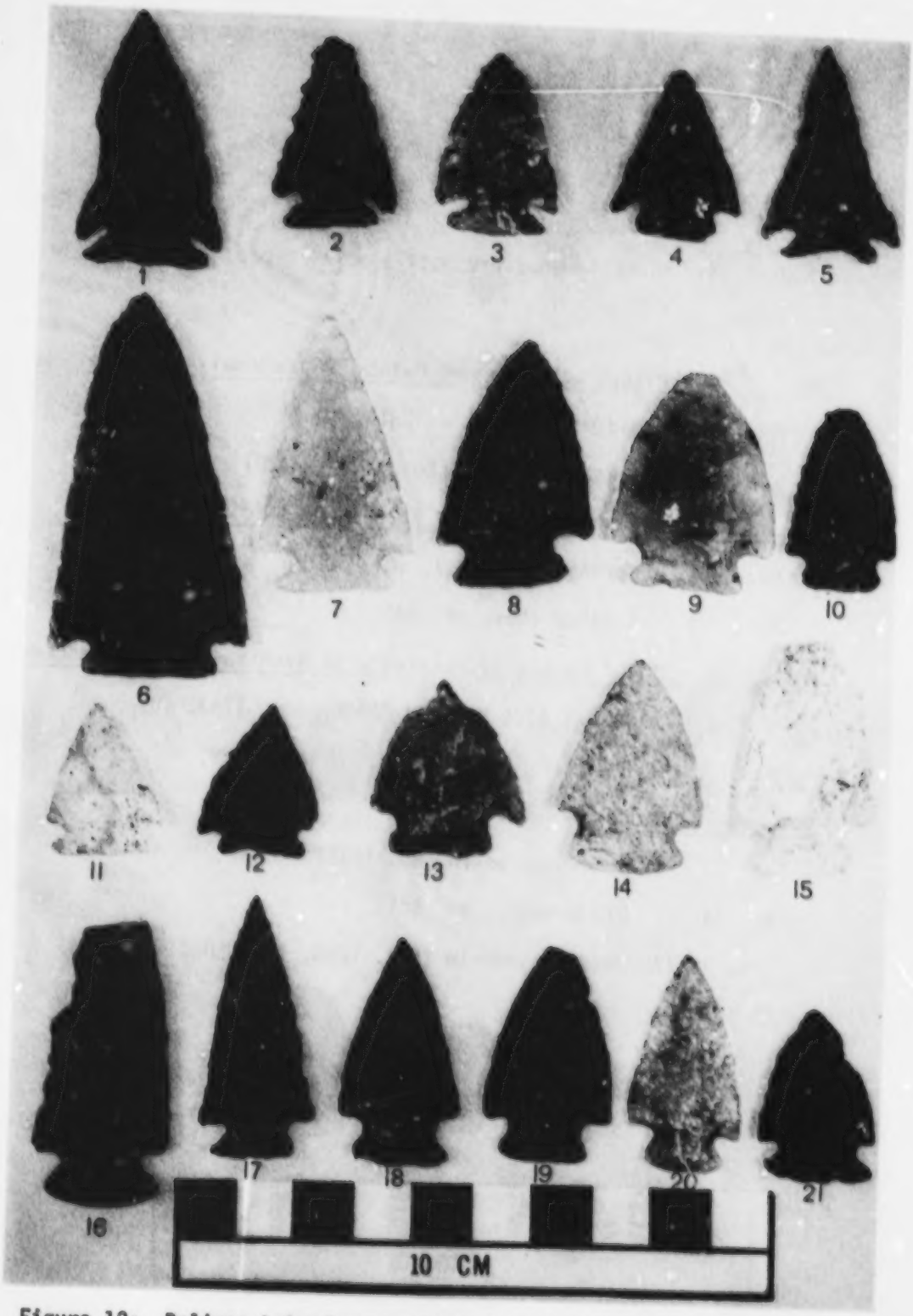

Figure 12: Pelican Lake Corner Notched projectile points.

Figure 13: Miscellaneous projectile point types.

Nos. 1-4 Pelican Lake Stemmed Points of Kootenai Argillite

- Nos. 1-2 Old Woman's (Nos. 1281A, 1289)
- Nos. 3-4 Head-Smashed-In (Nos. 2062, 2030)

Nos. 5-8 Pelican Lake Snapped Base Stemmed Points

- Nos. 5-6 Spring Creek (Nos. 501, 502)
- Nos. 7-8 Keaster (Nos. 14, 38)

Nos. 9-12 Atlatl Points associated with Avonlea at Head-Smashed-In

- Nos. 9-11 Besant Side Notched (Nos. 1895, 1733, 1994)
- No. 12 Pelican Lake Corner Notch (No. 1729)

Nos. 13-17 Hanna Points

- No. 13 Head-Smashed-In (No. 1234)
- No. 14 Old Woman's (No. 441)
- Nos. 15-17 Head-Smashed-In (Nos. 1290, 1278,2080)

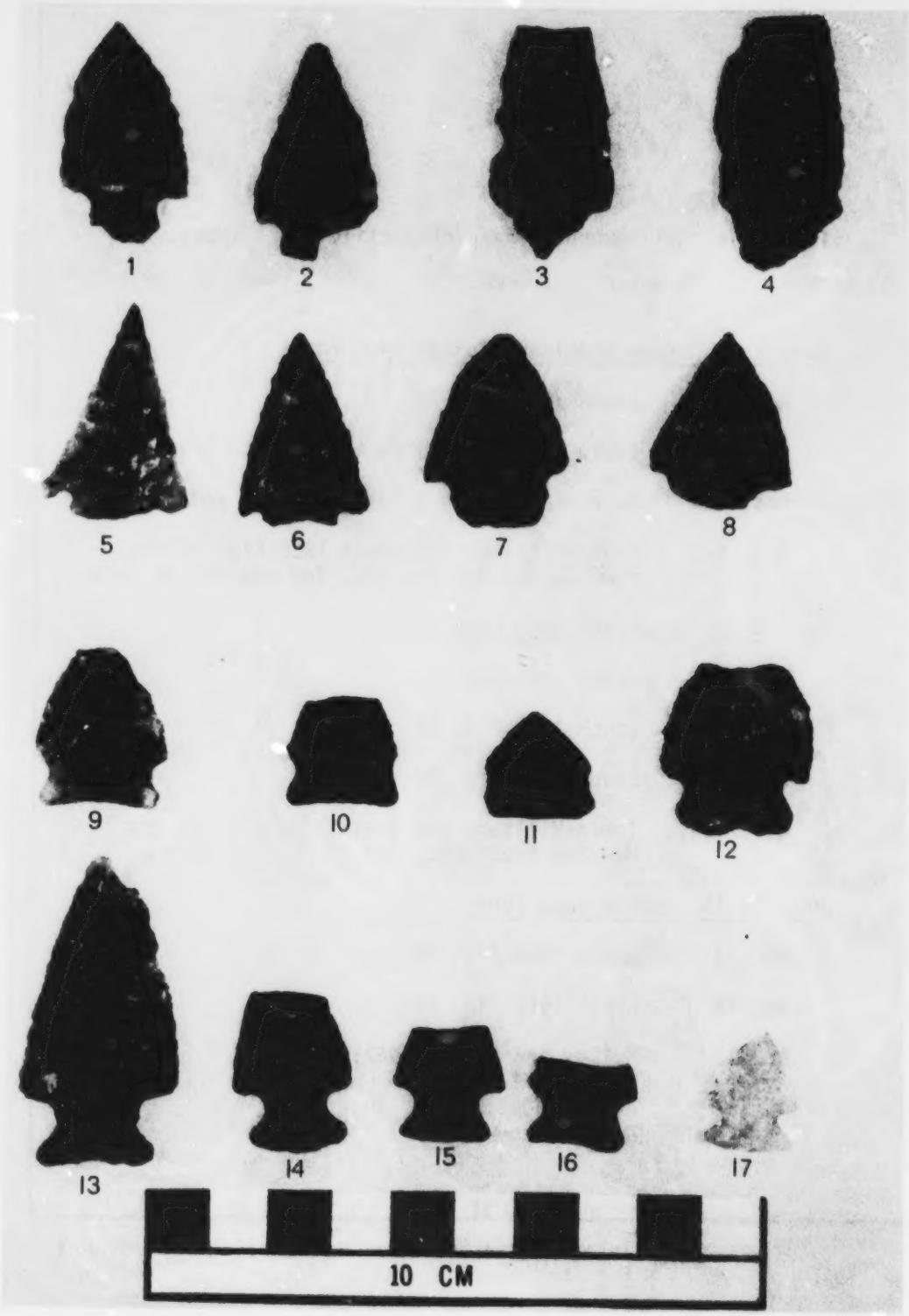

Figure 13: Miscellaneous projectile point types.

Figure 14: Willowbrook Phase projectile point types.

Nos. 1-7 Obtuse Shoulder--Convex Base Form

No. 1	Leach 1966:Fig. 3j
No.2	Irwin and Irwin 1959:Fig. 20 Type F 56-60
Nos. 3-4	Morris and Burgh 1954:Fig. 82 3n and o
Nos. 5-7	Irwin-Williams and Irwin 1966:Fig. 25 1st row 1st and 2nd on left, 2nd row 1st on left

Nos. 9-12 Recurvate Body Edge Form

No. 8	Leach 1966:Fig. 3n
No. 9	Leach 1967:Fig. 5f
No. 10	Leach 1966:Fig. 3o
Nos. 11-12	Irwin-Williams and Irwin 1966:Fig. 26 1st row 2nd from left, 2nd row 1st on left

Nos. 13-15 Nubbin Base Form

No. 13	Leach 1966:Fig. 3m
No. 14	Leach 1967:Fig. 6i
No. 15	Mulloy and Steege 1967:Fig. 13 3

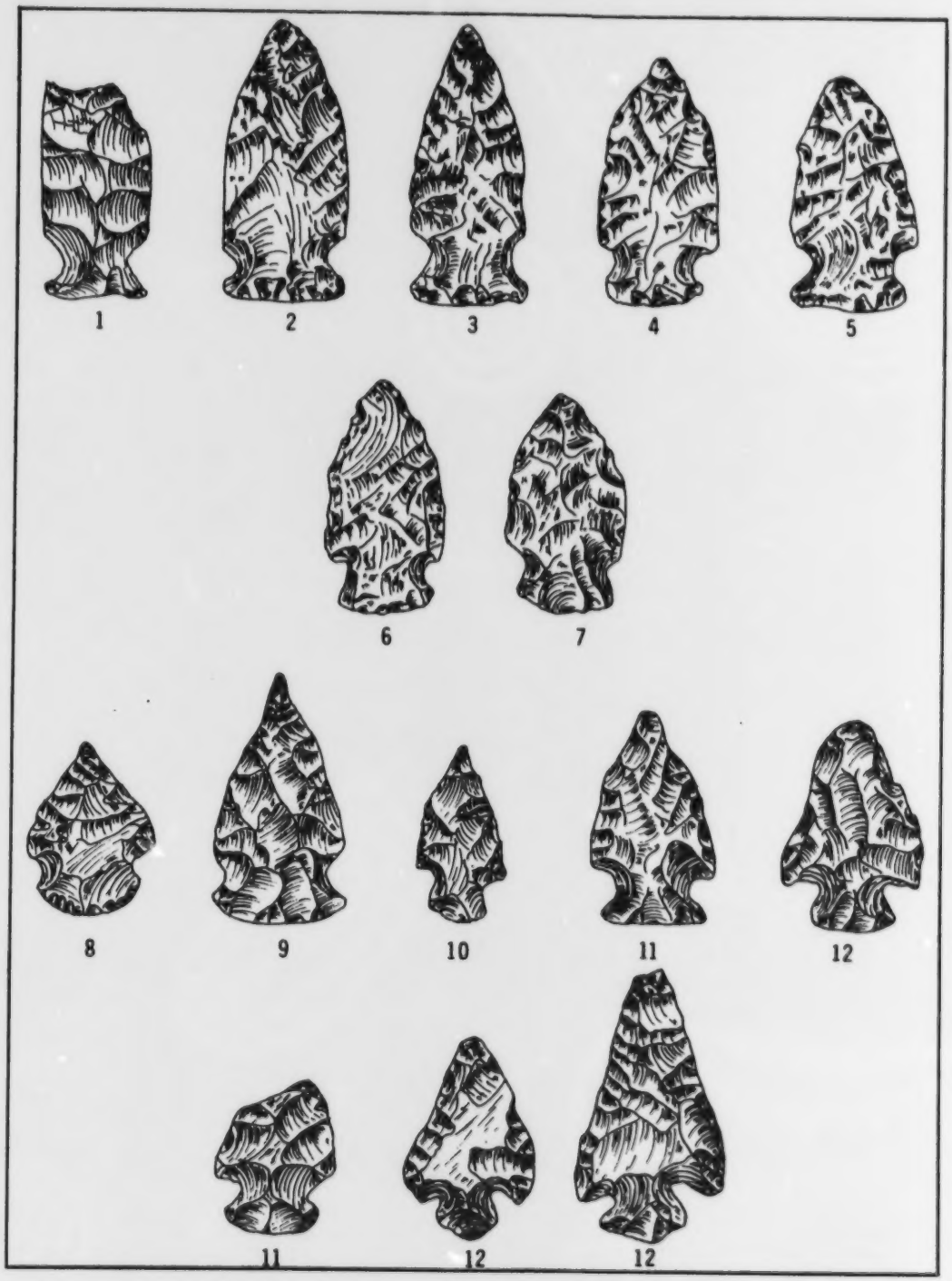

Figure 14: Willowbrook Phase projectile point types.

Figure 15: Avonlea and other projectile point types from Head-Smashed-In

Nos. 1-28	Timber Ridge Side Notched (Nos. 1694, 2819, 3152, 926, 3039, 1003, 3100, 1864, 2850, 927, 915, 3051, 2763, 1027, 2829, 1690, 2096, 2787, 923, 1034, 2882, 3042, 1997, 1010, 1039, 914, 1059, 813)
Nos. 29-36	Head-Smashed-In Corner Notch (Nos. 3259, 3273, 1615, 1915, 1616, 1919, 1075, 3284)
No. 37	Side Notched Point (No. 9721)
Nos. 38-40	Stemmed Points (Nos. 1614, 3263, 3165)
Nos. 41-42	Unnotched Points (Nos. 2950, 2786)
No. 43	Side Notched Points (No. 1542)

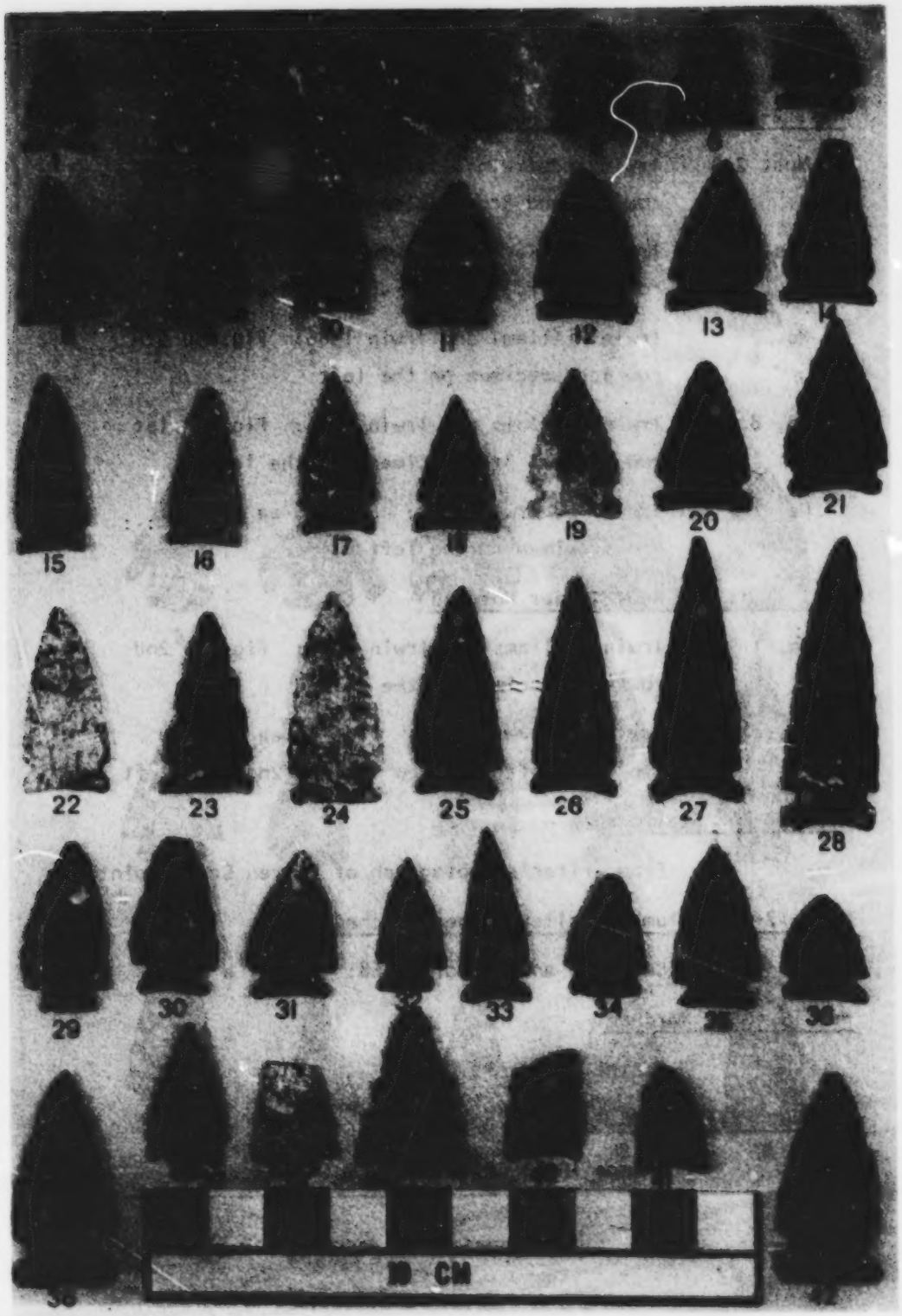

Figure 15: Avonlea and other projectile point types from Head-Smashed-In.

Figure 16: Other arrow point types

Nos. 2-10 Parker Corner Notched

Nos. 2-3	Irwin and Irwin-Williams 1966: Fig. 29 1st row 2nd and 3rd specimens on the left
Nos. 4-6	Irwin-Williams and Irwin 1966: Fig. 30 3rd row 1st, 3rd, and 4th specimens on the left
No. 7	Irwin-Williams and Irwin 1966: Fig. 30 5th row 3rd specimen on the left
No. 8	Irwin-Williams and Irwin 1966: Fig. 30 1st row 2nd and 3rd specimens on the left
No. 10	Irwin and Irwin 1959: Fig. 26 aa 1st row 4th specimen on the left

Nos. 1, 11-13 Ruby Corner Notched

No. 1	Irwin-Williams and Irwin 1966: Fig. 30 2nd row 4th specimen on the left
Nos. 11-13	Irwin and Irwin 1959: Fig. 26 aa 1st row 4th from left, 2nd row 1st and 2nd from left

Nos. 14-16 Scallorn

From writer's photograph of Patten Creek points

Nos. 17-18 Columbia Valley Corner Notched

Caldwell and Mallory 1968: Pl. 11 a and w

No. 19 Side Notched

Champe 1946: Pl. 11 f

No. 20 Tri-Notched

Champe 1946: Pl. 12 d

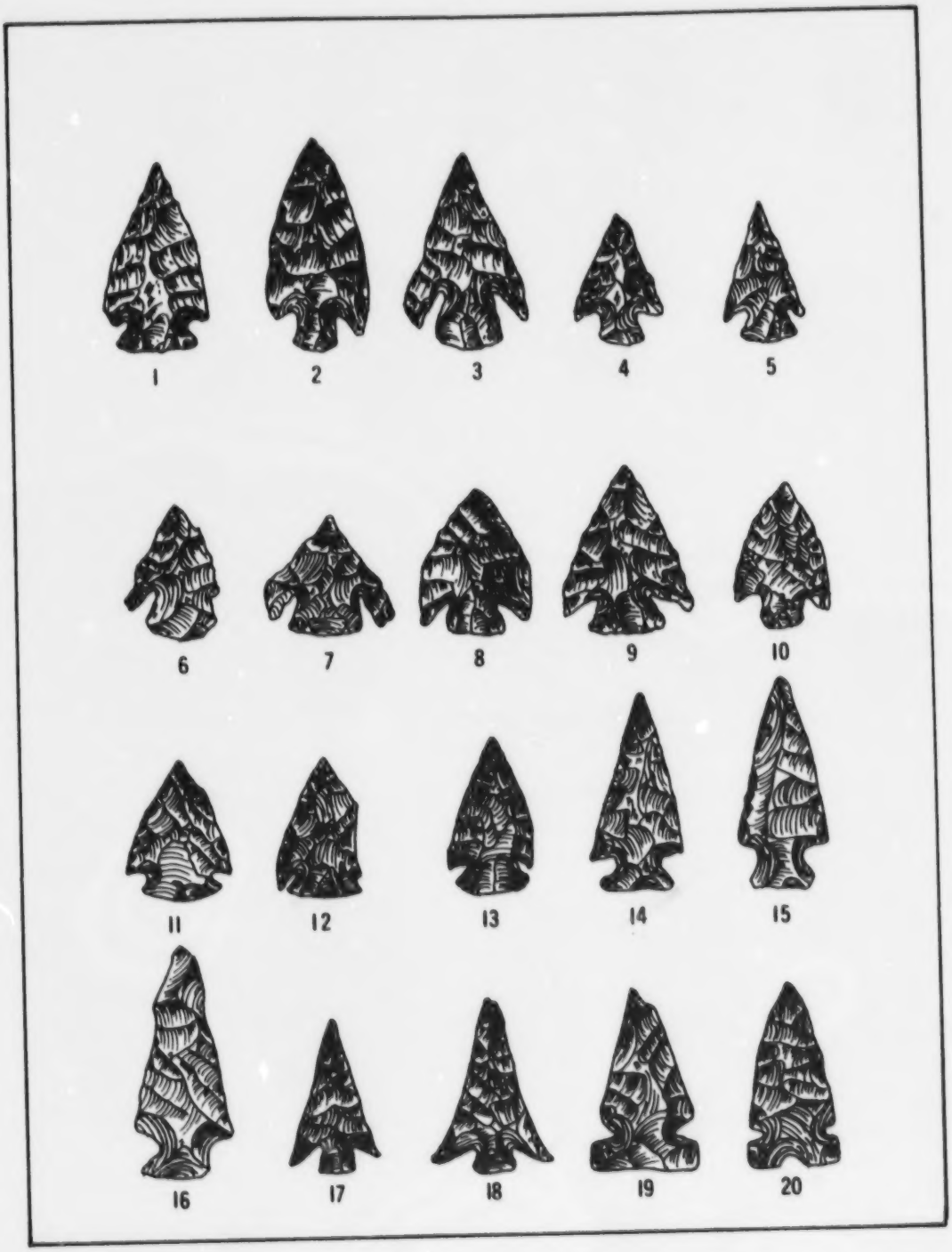

Figure 16: Other arrow point types.

Figure 17: Besant Side Notched and Samantha Side Notched points from the Leavitt site.

Nos. 1-15	Samantha Side Notched (Nos. 29, 53, 24, 52, 30, 51, 32, 17, 48, 16, 12, 33, 7, 22)
Nos. 16-19	Besant Side Notched (Nos. 7, 26, 13, 56, 10)

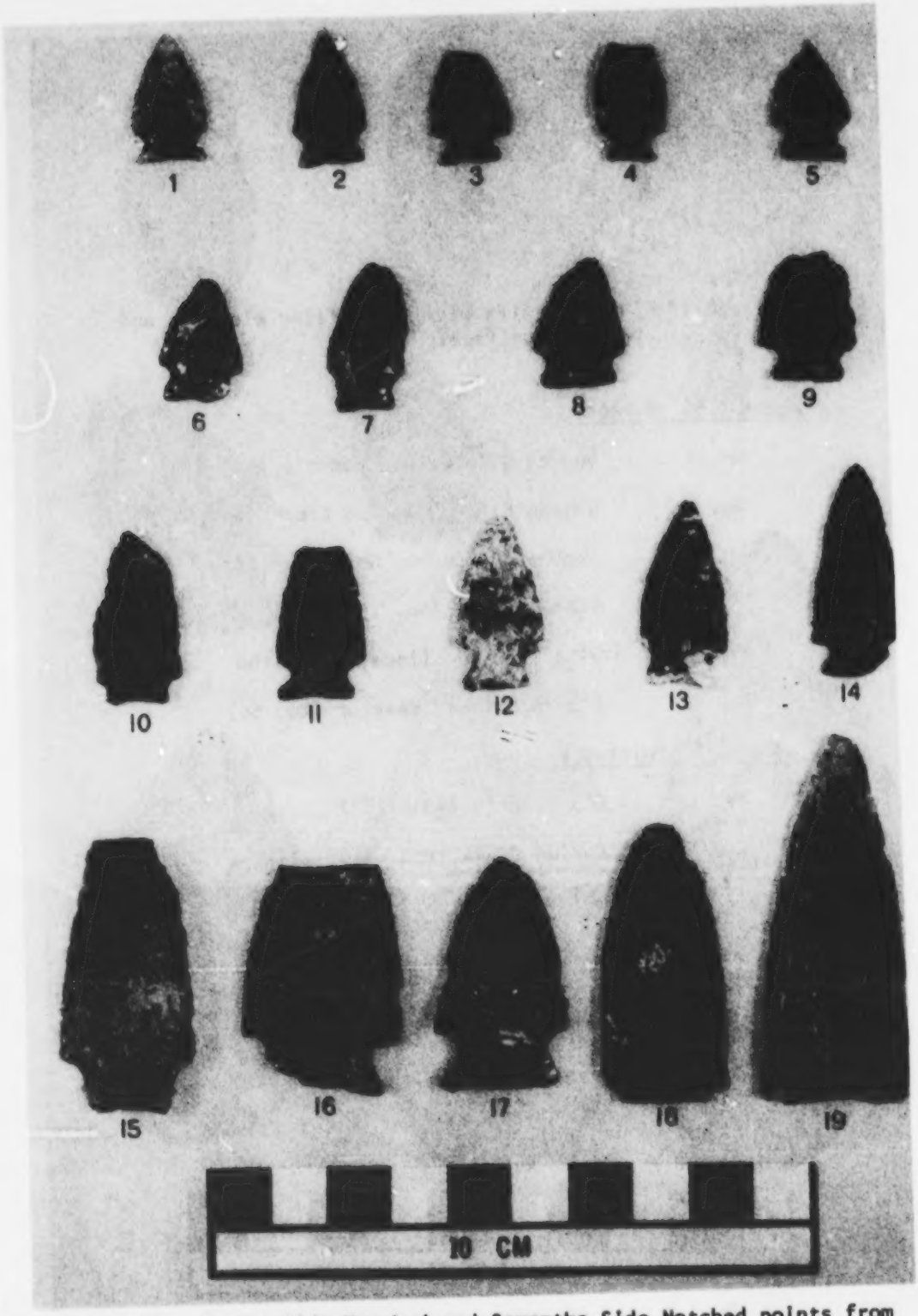

Figure 17: Besant Side Notched and Samantha Side Notched points from the Leavitt site.

Figure 18: Bifaces with modified hafting elements and pointed unifaces

Nos. 1-5 Bifaces

No. 1	Duncan Biface, Old Women's (No. 819)
No. 2	Duncan Biface, Spring Creek (No. 507)
No. 3	Asymmetric Corner Notched Biface, Blue Slate Canyon (No. 154)
No. 4	Side Notched Biface, Williston
No. 5	Glendo Biface, Keaster (No. 66)

Nos. 6-8 Pointed Unifaces

No. 6	Old Women's (No. 1287)
Nos. 7-8	Spring Creek (Nos. 516, 520)

Figure 18: Bifaces with modified hafting elements and pointed unifaces.

Figure 19: Biface types

Nos. 1-2	Ovate symmetric convex base
Nos. 3-4	Ovate symmetric straight base, Kenney (No. 9778) Spring Creek (No. 517)
No. 5	Oval convex base, Spring Creek (No. 517)
No. 6	Ovate symmetric oblique base, Kenney (No. 156)
No. 7	Oval straight base Kenney (No. 847)

Figure 19: Biface types.

Figure 20: Avonlea biface types from Head-Smashed-In

No. 1	Asymmetric ovate (early Avonlea) (No. 1370)
Nos. 2-3	Diamond shape (Nos. 881, 1866)
Nos. 4-6	Asymmetric ovate (late Avonlea) (Nos. 1308, 2650, 665)
No. 7	Asymmetric ovate--bipoint (early Avonlea) (No. 2814)
Nos. 8-10	Asymmetric lanceolate (late Avonlea) (Nos. 339, 664, 563)

Figure 20: Avonlea biface types from Head-Smashed-In.

Figure 21: Outlines of various biface types

No. 1 Oval

No. 2 Oval--straight base

No. 3 Circular

No. 4 Triangular--convex base

No. 5 Triangular--straight base

No. 6 Trianguloid

No. 7 Rectanguloid

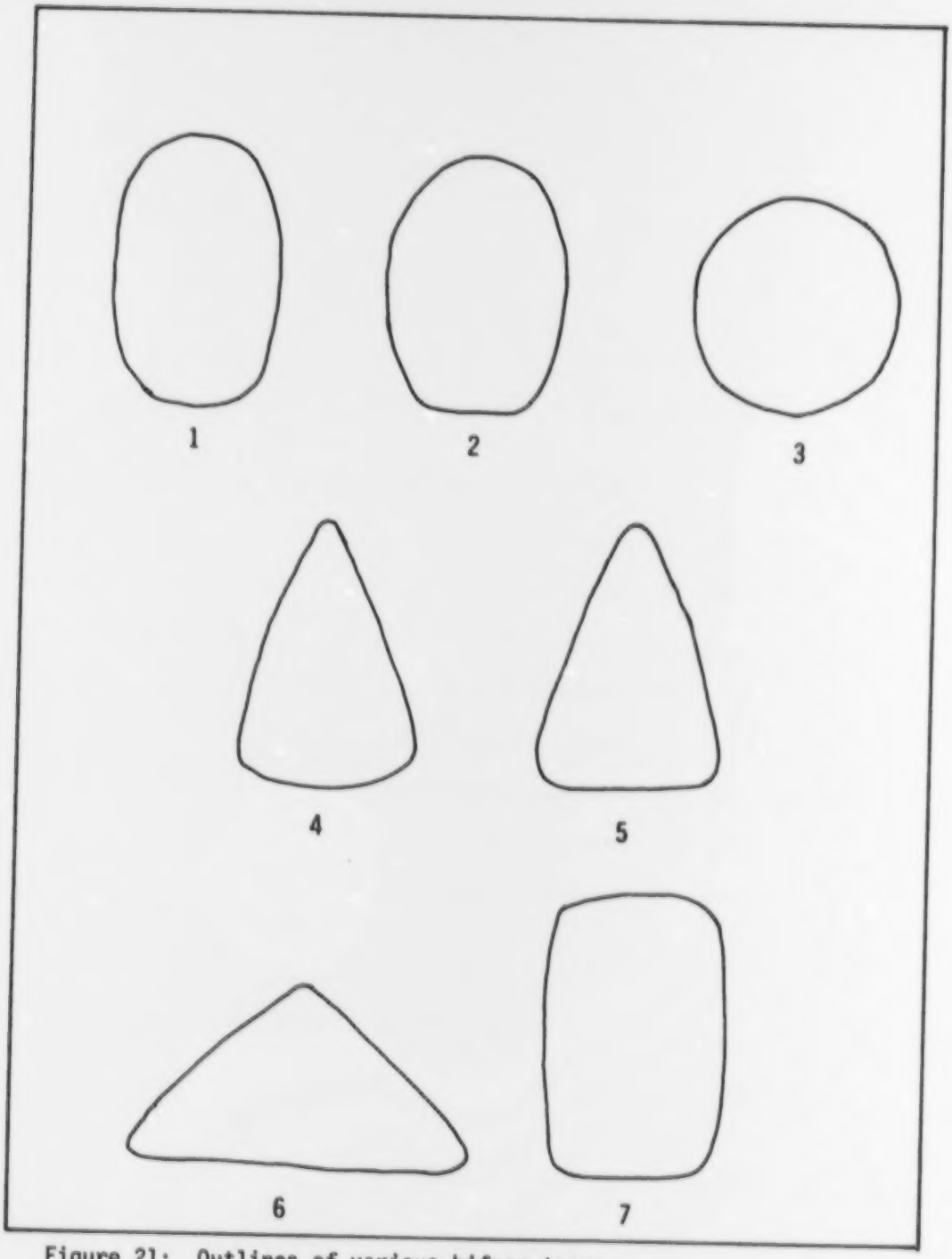

Figure 21: Outlines of various biface types.

Figure 22: Drill, perforator, and graver types

No. 1 Irregular flake butt drill

No. 2 T butt drill

No. 3 Oval butt drill

No. 4 Ovate drill

No. 5 Pentagonal butt drill

No. 6 Medial flange drill

No. 7 Notched perforator

No. 8 Tit graver

No. 9 Notched graver

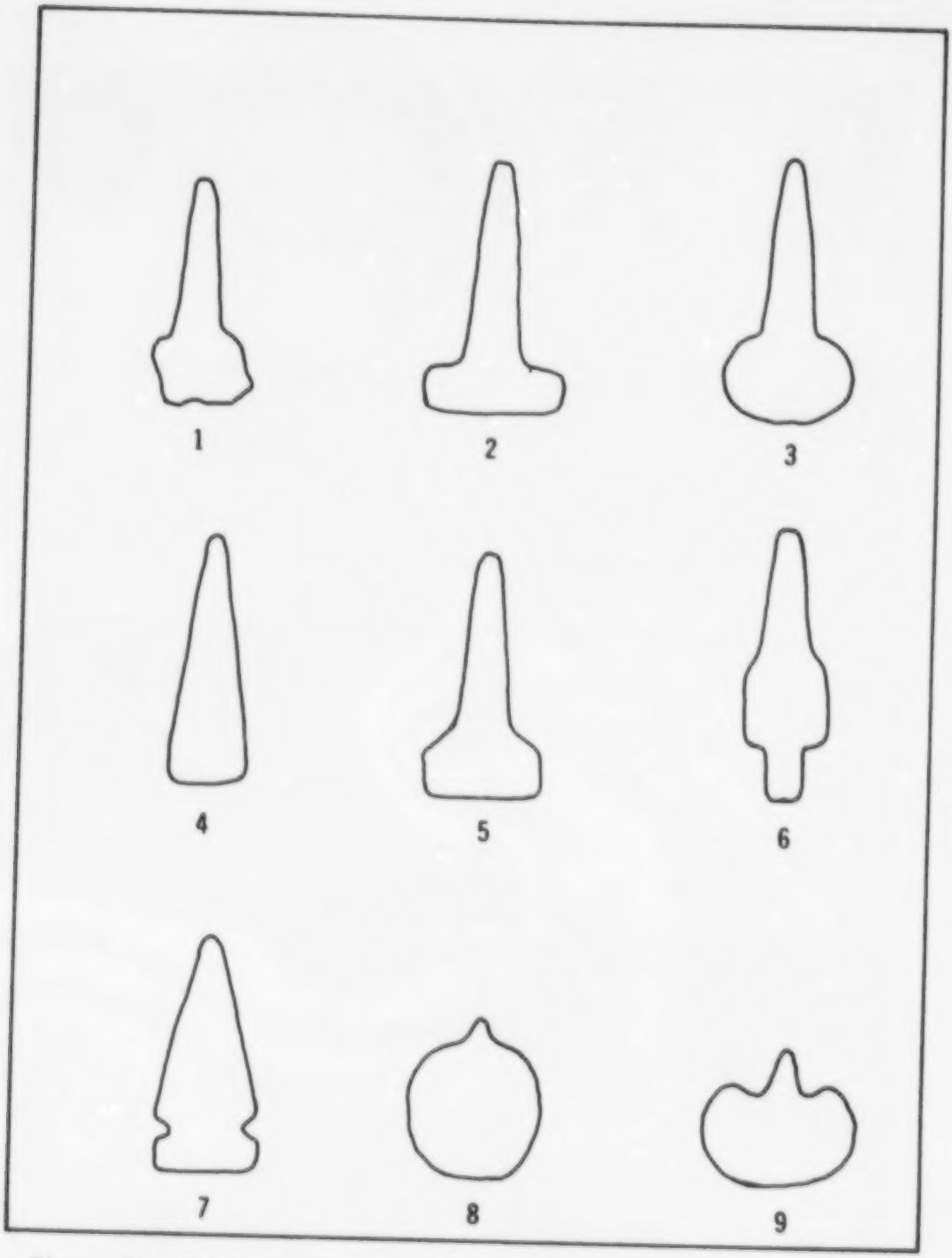

Figure 22: Drill, perforator and graver types.

Figure 23: Besant Phase end scrapers from the Kenney site

Nos. 1-10 Dorsally finished forms (Nos. 149, 155, 766, 681, 704, 1046, 765, 1123, 922, 1029)

Nos. 11-19 Dorsally unfinished forms (Nos. 730, 142, 127, 138, 198, 139, 673, 672, 7620)

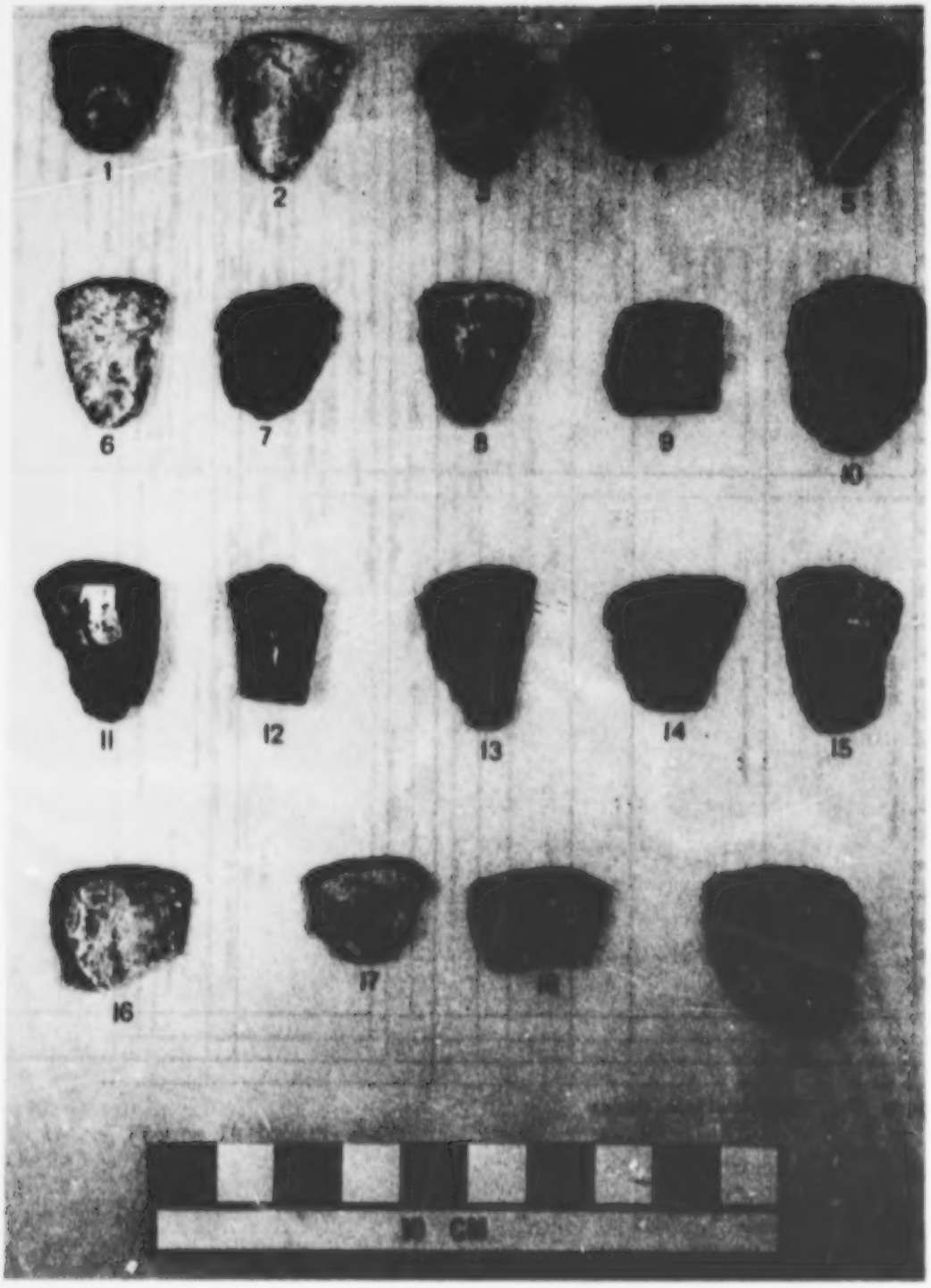

Figure 23: Besant Phase end scrapers from the Kenney site.

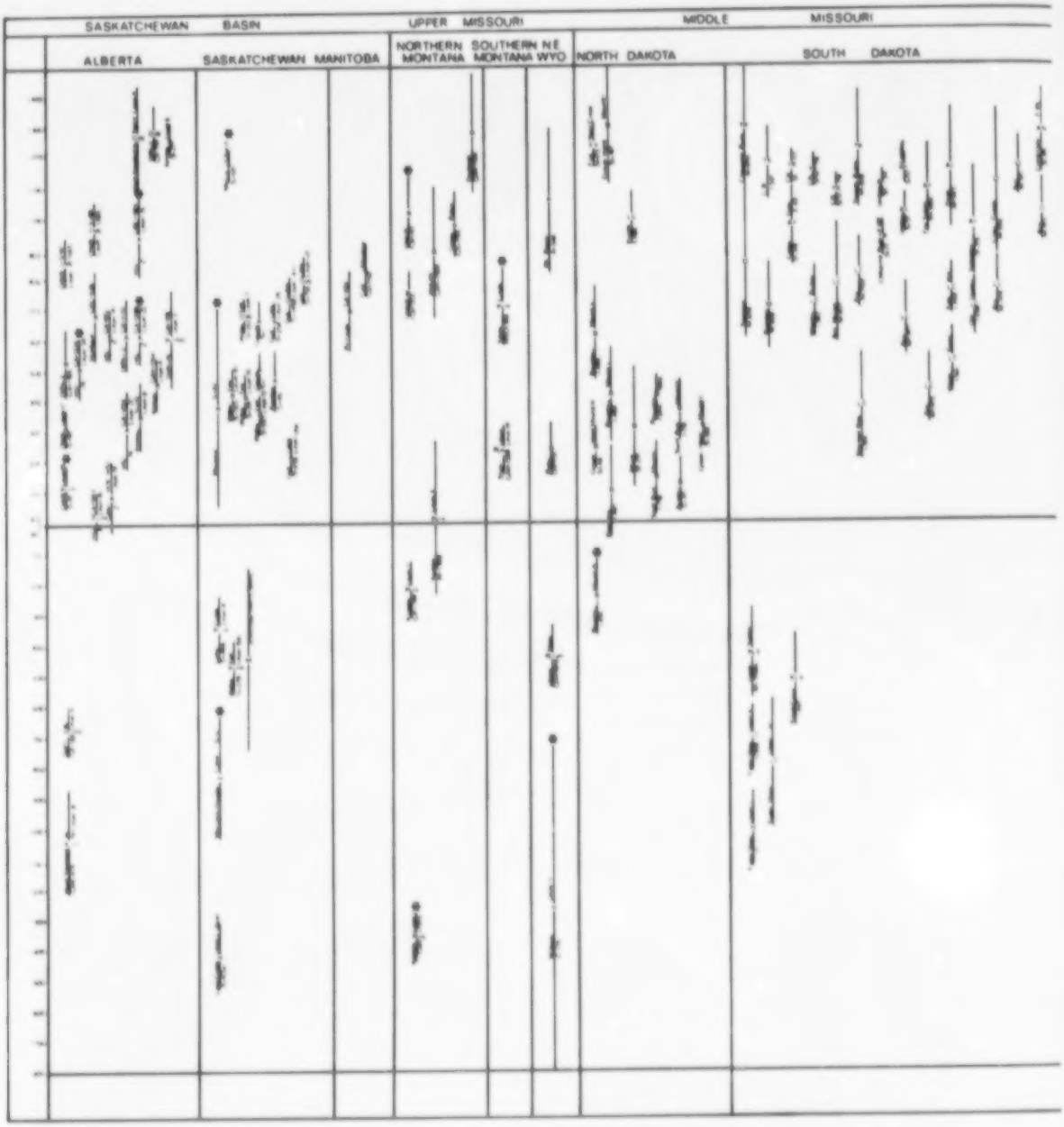

Figure 24: Radiocarbon Dates

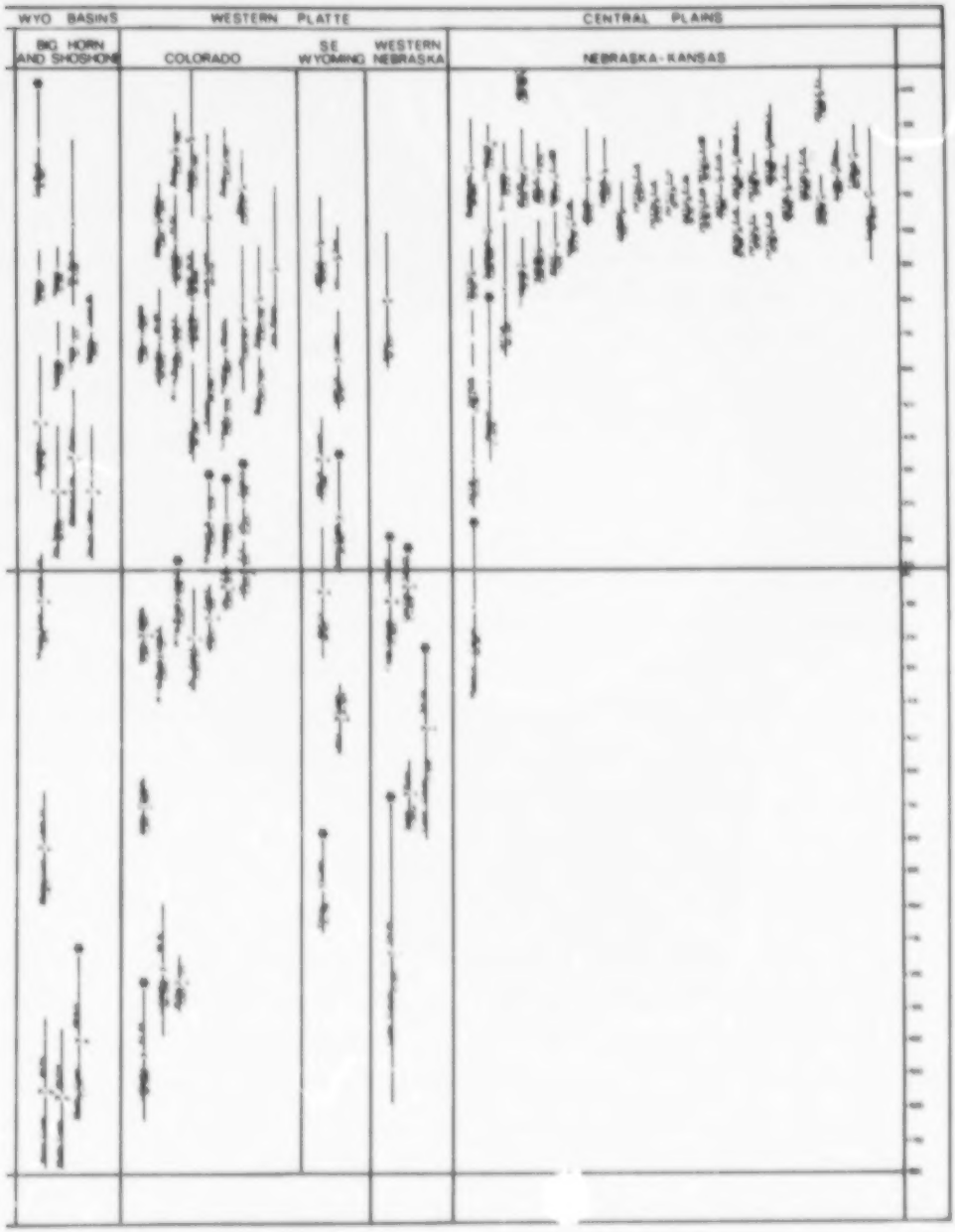

Figure 24 (continued)

APPENDICES

APPENDIX I

UNPUBLISHED SITE DESCRIPTIONS

ADKINS KILL

The Adkins Kill and campsite, Dawson County, Montana, is located in a pass over the Redwater divide, twenty miles north-northeast of Lindsay, Montana. The kill-campsite is located on a tributary of the Red Water River. Mr. Meeds, of Glendive, Montana, holds a small collection of Pelican Lake points from the site.

AGENCY KILL (24BL405)

The Agency Kill, a multiple component Besant Kill, is situated in colluvial-alluvial deposits in the east bank of a dry wash, adjacent to the Fort Belknap Agency, Blaine County, Montana. The site lies on the south side of the Milk River. Stratigraphically, the cultural deposits consist of three well-separated bone beds, capped by some ten feet of slope and gully wash. The site has suffered from severe depradations by local collectors. Surface collections are held by the Milk River Archaeological Society. The site is briefly mentioned by Davis and Stallcop (1966).

AVON NO. 1 (24PW347)

Avon No. 1, a quarry-campsite, is situated on the east side of an isolated hill, in the middle of the Avon Valley, Powell County, Montana. The quarry pits, ranging up to 40 feet in diameter, and up to 6 feet in depth, cover an area in excess of 1,000,000 square feet. Associated with these pits are tipi rings which seem to have functioned as chipping stations. The entire area is littered with chipping debris and artifacts. In some areas these deposits are well in excess of three feet thick. Mr. George W. Arthur, the discoverer, has made extensive collections from the site. Projectile points indicate the site has been in use since recession of the last Cordilleran ice sheet from the area.

The quarried material is a fine-grained, light-brown, sedimentary chert, containing occasional gastropods, and patinates on external surfaces

to a diagnostic chalky white. Stratigraphically it is Tertiary in age. The chert is widely distributed in archaeological sites of the Rocky Mountain Foothills region of central Montana and southern Alberta.

BENTLY KILL

The Bently Kill, a single component Pelican Lake Kill, Fallon County, Montana, is located near the Teedee P. O., in a dry wash on the west side of O'Fallon Creek, which is a tributary of the Powder River. Mr. McCurdy of Broadus, Montana has a small collection from the site. It contains a high frequency of unnotched points associated with Pelican Lake points.

BEL SITE

The BEL campsite, Wheatland County, Montana, is situated in a basin in the Crazy Mountains, at the forks of the Big Elk Creek, a minor tributary of the Musselshell River. The multiple component site is contained within a mature soil profile developed on alluvium from Big Elk Creek. Waters impounded by Big Elk Lake, a stock reservoir on the east fork of the creek, have exposed an extensive area to wind and water deflation. The major occupation correlates with a buried horizon two feet below surface.

Exposed features consist of basin-shaped, rock-filled hearths and scattered disarticulated bison bones. Mr. Harlan B. Lucas, an amateur from Harlowton, located the site several years ago, and has made periodic collections from it. Examination of his collections revealed the major component to belong to the Pelican Lake Phase. Other minor components are associated with earlier phases, primarily Powers-Yonkee. Still later phases are characterized by small-stemmed and serrated points, and more recently, small side notched arrow points.

CALF MOUNTAIN SITE

The Maxwell area (SW 1/4; sec. 5; T.3; R.7; W.1) is situated 3/10 of a mile north of the Calf Mountain Mound, Manitoba. The occupation is contained within the Darlingford clay loam, and lies 27 centimeters below the original surface. A yellow boulder clay is situated 11 centimeters below the occupation. Aside from the strip along a municipal road, the site has

been destroyed by plowing. Mr. Chris Vickers, discoverer of the site, has made an extensive collection from it (Chris Vickers, pers. comm.). a collagen extract from a bone sample from the undisturbed area yielded a date of A.D. 845 ± 85 (GX-1192).

CHARLOTTE KILL

The Charlotte Kill, Powder River County, Montana, a single component Pelican Lake Kill, is located in a gully on the east side of the Powder River, just east of Broadus, Montana. McCurdy has a small collection from the kill which contains a number of unnotched points associated with typical Pelican Lake types.

GLENDIVE KILL

The Glendive Kill, Dawson County, Montana, is located in the Mountain Sheep Bluffs, fifteen miles northwest of Lindsay, Montana. McCurdy's collection contains both Pelican Lake and Besant points. It is not certain whether this is a single or multiple component kill.

HARLOWTON KILL

The Harlowton Kill, Wheatland County, Montana, is a multiple component kill, located just west of Harlowton, Montana, on the south side of the Musselshell River. Mr. Harlan Lucas has a small collection from the kill which indicates that it contains both Besant and late side notched components.

HEAD-SMASHED-IN BUFFALO JUMP (DkPj-1)

The site, the largest and oldest known buffalo jump in the Northern Plains, lies along the southeast edge of the Porcupine Hills, 3 miles north of the Oldman River, and 12 miles west of Fort Macleod, Alberta. The kill deposits, extending for over 800 x 200 feet along the cliff face, are situated in a slump terrace, some 40 feet below the top of an easterly facing outcrop of Porcupine Hills sandstone. At the base of the terrace, ca. 60 feet below the kill, lies the associated campsite DkPj-2, which encompasses a total area in excess of a quarter section. Behind the jump, in the headwaters of Olson Creek lies a gathering basin encompassing an area in excess of 25 square miles. A complicated set of drive lanes is

found within the basin.

Excavations, carried out by the writer (Reeves n.d.) in 1965 and 1966, were designed to establish the cultural sequence in the jump and campsite. Three stratigraphic cuts in the jump reached basement at depths from 15 to 35 feet below surface. From a total sample area of some 15,000 cubic feet, some 4,000 artifacts were recovered, approximately three-quarters of which were projectile points.

The provisional cultural sequence is as follows:

Phase I	Oxbow-McKean 3460 B.C. ± 300 (GSC-803) to 2100 B.C. ± 100 (GAK-1476).
Phase II	Pelican Lake 1090 B.C. ± 120 (GAK-1474) to A.D. 90 ± 120.
Phase III	Besant ca. A.D. 90.
Phase IV	Avonlea A.D. 90 ± 120 (GAK-1475) to ca. A.D. 750.
Phase V	Old Women's ca. A.D. 750 to ca. 1825. Termination based on the presence of white trade goods.

The small area sampled in the campsite revealed a time depth back to Pelican Lake. Excavated features included: hearths, fire pits, cache pits, ovens, bison bones, fire-broken rock and artifacts.

Associated geo-ecologic studies have been carried out by: Soils Division, Research Council of Alberta; Soils Division, Department of Agriculture, Research Station, Lethbridge, Alberta; Geological Survey of Canada; and Department of Bacteriology, The University of Alberta. The site has been deeded by the estate of Mr. Alex Calderwood, and is now a provincial park.

LEAVITT KILL

The Leavitt site (Reeves n.d.; Davis and Stallcop 1966), a multiple component kill, is situated on the west side of a small coulee draining northwards into the Tiber Reservoir, Toole County, Montana. Immediately to the east lies the Rinehardt, Avonlea Kill (Davis 1966).

Stratigraphically, the site consists of two discrete components; a

Besant-Samantha component 44 centimeters below surface and side notched component 20 centimeters below surface.

The site, originally located by Mr. Carle Leavitt, Conrad, Montana, was sampled by the writer in July 1967 in order to obtain a sample for dating and to secure a sample of Besant and Samantha points. Mr. Leavitt has an excellent collection from the site, and he has donated a few samples to the River Basin surveys. The original collagen date on the Besant component, obtained by Mr. Leavitt, is A.D. 1005 ± 120 (GX-146). A sample collected by the writer yielded a date of A.D. 770 ± (GX-1212).

MALTA KILLS

The Malta Kills, Phillips County, Montana, are a group of four single component kills situated in small draws on the south side of the Milk River, north of Malta, Montana. The kills, which were completely destroyed by collectors, are associated wtih drive lanes and corral posts. Culturally, they are assignable to the Late Prehistoric, Timber Ridge Avonlea, Besant, and Pelican Lake Phases. Bone uprights were found in the Besant Kill by Mr. Elletson, Havre, Montana, who has an extensive collection from the kills.

ROUND UP KILL

The Round Up Kill, a multiple component kill in Musselshell County, Montana, is located on a minor tributary of the Musselshell River, northwest of Roundup, Montana. Mr. Harlan Lucas has a small collection from the site which indicates the presence of Powers-Yonkee, Pelican Lake and Besant components.

RUBY KILL (48CA302)

The Ruby Kill is located approximately two miles west of South Pumpkin Butte, in the southwest corner of Campbell County, Wyoming. The single component Besant Kill lies 8-10 feet below surface, on the northwest side of a 40-foot deep dry wash which drains into the Powder River. The lateral extent of the one-foot thick bone bed is some 70 feet. It is enclosed within a sandy clay soil. Bedrock, Wasatch sandstone, lies a foot or so below the cultural layer.

Local arrowhead collectors have removed some five feet of deposits over the last 10 years, finding numerous points and flakes. Other tools, wood (corral fence), and large stones are reported. A small collection of points including one grooved canid canine, has been recovered by the Gillette Chapter, Wyoming Archaeological Society.

An associated campsite, yielding a heavy concentration of artifacts, flakes, fire-cracked rock, shattered bison bones and charcoal, is located some 125 yards upstream (William Barlow, pers. comm.). Tests have been carried out by the Chapter during 1968, and extensive slavage excavations are planned by the Chapter in the near future. A carbon sample from the kill has yielded a date of A.D. 280 ± 195 (GX-1193).

RUFFADO KILL

The Ruffado Kill, Richland County, Montana, is situated on the south side of the Missouri River, opposite the town of Brockton, Montana. McCurdy's collection contains Pelican Lake and Besant points from the kill. It is not certain whether this is a single or multiple component kill.

STELLINGS KILL

The Stellings Kill, a multiple component Besant Kill, is located 3/4 of a mile north of the Dago Hill Kill (Shumate n.d.), a few miles west of Fort Shaw, Cascade County, Montana. The kill, situated in alluvial deposits of a low terrace on the south side of the Sun River, lies on the north side of a 15-foot high strath terrace.

Three discrete bone beds have been exposed in an irrigation cut. They lie at a depth of 1.0, 3.8, and 4.8 feet below surface. Large sandstone slabs and river cobbles are associated with the lower two components. Mr. Maynard Shumate, discoverer of the site, has excavated a sample of Besant points. A bone sample from Level 2 yielded a date of A.D. 1280 ± 200 (GAK-1504).

STATE LINE KILL

The State Line Kill, Harding County, South Dakota, is a single component Pelican Lake Kill, located on Box Elder Creek in the extreme northwest corner of South Dakota. McCurdy has a small collection of Pelican Lake points from the site.

TIBBITS KILL

The Tibbits Kill, Prairie County, Montana, a single component Pelican Lake Kill, is located in a small draw, 32 miles west of Glendive, Montana. Mr. Curtis Meeds of Glendive, Montana has a small surface collection from the site (Curtis Meeds, pers. comm. to Leslie B. Davis).

UPPER MILES KILL

The Upper Miles Kill, Powder River County, Montana, a single component Pelican Lake Kill, is situated on the northwest side of a small dry wash, draining westerly into the Powder River, some 10 miles northeast of Broadus, Montana. The bone bed lies at a depth of three feet below surface. McCurdy located the site, and has an extensive collection from it. A bone sample yielded a date of 470 B.C. $\pm$ 110 (GAK-1503).

APPENDIX II

ABSOLUTE AND RELATIVE DATING

This appendix deals with the temporal placement of the various phases under consideration in this thesis. Since other methods of absolute chronological control such as dendrochronology are not operative in this area, the dating of all phases ultimately rests on the radiocarbon method.

In the study area, 155 radiocarbon dates listed in Tables 11 through 21 relate directly to the phases under consideration. Tables 22 through 24 list other dates which are relevant to the dating of the phases in this thesis, particularly the termination of the Plains Horticultural phases of Loseke, Keith, and Parker. Fig. 22 graphs the dates listed in Tables 22 through 24, except for those dates whose values lie outside the temporal scale of the graph.

Table 25 lists all unacceptable dates.

Numerous sources of error are inherent in the radiocarbon method. Polach and Golson (1966) present an excellent summary of most sources, such as faulty activity measurements, misassociation of sample and event, pre- and post-sampling contamination, lab errors, uncertainty of C-14 at time of date, deVries effect, and isotopic fractionation.

The deVries effect indicates that for the interval 250 B.C. to A.D. 1000 radiocarbon dates "are generally ca. 50 to 100 yr older than true ages, but deviations from this rule are possible" (Stuiver and Suess 1966: 537). Beyond this time, deviations are even greater so that "a radiocarbon age of 4000 yrs for example corresponds to a true age more than 500 yr greater" (Stuiver and Suess 1966:539).

For the period 1000 B.C. to A.D. 1000, the difference between the radiocarbon year and the true calendric year varies through time. While the deVries effect is not particularly important for the dating of phases in the first millenium B.C., it is quite important in the first millenium A.D., as it differentially affects the relationship between the radiocarbon age and the true age. For the first 500 years and last 200 years

of the millenium, radiocarbon dates are 50 to 100 years older than calendrical dates. For the period between A.D. 500 to 800, the true dates and radiocarbon dates correspond quite closely.

The deVries effect affects the dating of the same or different phases in various areas at different temporal intervals by differentially increasing the variance between phase initiation in these areas. I do not, however, feel that I can do more than acknowledge this fact as considerable work still remains to be done on the relationship between radiocarbon ages and calendric ages. Consequently, all dates in this thesis refer to radiocarbon rather than to true years.

It should also be noted that all radiocarbon dates utilized in this thesis are based on the half life of 5570 ± 30 years as are the variations of radiocarbon age from true age. Correction to the new half life of 5730 ± 30 years would, in most instances, give a closer correspondence between the radiocarbon age and the true age. This has not, however, been undertaken in this thesis.

Radiocarbon dates utilized in this thesis have been obtained from a variety of materials such as wood, charcoal, charred bone, pyrolized bone, bone collagen, and shell. Of the above, fresh water shell is considered the most unreliable material for dating. Collagen extracts from bone are considered by some workers to be unreliable. However, the collagen dates utilized in this thesis, with few exceptions, show a good correspondence with dates obtained on charcoal or burned bone from other sites of equivalent age.

The most important source of error in interpreting radiocarbon dates lies in the calculation of the error, which is always given as 1 Sigma in this thesis. There is only a 68.27 per cent chance (about 2 out of 3) that the true date lies within the indicated limits. If, however, the error is increased to 2 Sigma, the probability is 95.45 per cent (about 19 out of 20) that the true result lies within the indicated limits. This probability applies both to a single age determination and to a series of dates.

For the 155 dates under consideration in this thesis it may be predicted that 49 dates will have their true value outside 1 Sigma, that 7 true values will lie outside 2 Sigma, but that only 4 dates will have

their true value lying outside 3 Sigma.

Polach and Golson (1966) propose a test to determine the relative probability of two dates representing the same or separate events. This test involves taking the arithmetic difference of a set of age determinations (subtracting mean ages), taking the square root of the sum of the squares of each standard deviation and comparing this with the difference in age. If the arithmetic difference is less, then it is highly probable that the two dates are not significantly different in age. If the arithmetic difference is less than twice as large as the combined SD it is fairly probable that the ages are significantly different. However, Polach and Golson feel that, in this case, the results should be interpreted more as being due to chance alone, than to absolute differences in age. If the arithmetic difference is greater than twice as large, it is probable that the ages are different, and when more than three times as large it is highly probable that the ages are different.

The usefulness of the above two predictive devices may be illustrated by a series of dates from Head-Smashed-In. This series consists of a stratigraphically inferior date from the Besant level of A.D. 490 ± 90 (GX-1220) and the stratigraphically superior Avonlea dates, A.D. 305 ± 130 (GX-1252), A.D. 90 ± 120 (GAK-1475), and A.D. 615 ± 95 (GX-1399). The Avonlea dates are all from stratigraphically equivalent levels.

Inspection of the 1 Sigma range of the Avonlea dates indicates that GX-1399 falls outside the 1 Sigma range of the other two, suggesting that the true value lies outside the 1 Sigma range. This substantiates the fact that one of three dates representing the same event may have the true date lying outside the 1 Sigma range. Application of the Polach-Golson test also indicates that it is highly probable that GX-1399 is unacceptable at 1 Sigma. If we apply the test at 2 Sigma the results indicate that the date may be accepted when tested against GX-1252.

The usefulness of these tests is illustrated by comparing the Besant and Avonlea dates. If the only two dates available were GX-1220 (Besant) and GX-1399 (Avonlea) one would assume them to be correct since stratigraphically Besant is below Avonlea, and the dates are significantly different. However, three dates are available for Avonlea and application of probability theory and the Polach-Golson test indicates that the GX-1399

date is not acceptable at 1 Sigma.

If the only two determinations present were the Besant GX-1220 and Avonlea GX-1252, application of the test would indicate that they are not significantly different and one would assume they represent two separate events very close in time. If the only other Avonlea date available was GX-1399, we would obviously reject the Avonlea GX-1252 determination at 1 Sigma. However, another Avonlea date is available which allows for rejection of GX-1399 at 1 Sigma as application of the test indicates that GX-1252 and GAK-1475 probably represented the same event.

If the only Avonlea date available was GAK-1475, results of the test would indicate that the dates are significantly different and therefore represent different events. Since Besant is stratigraphically below Avonlea, we would reject the Avonlea determination. However, since another Avonlea date is present which is not significantly different from the GAK-1475 date, we can accept the two Avonlea dates and reject the Besant date at 1 Sigma.

In sum, the above discussion points to the necessity of obtaining three dates on each sample or component whenever possible.

After the various components were assigned to phases on the basis of projectile points, etc., as outlined in the introduction, the dated components with coded phase associations were graphed (Fig. 22) at 1 Sigma error. The interphase boundaries for areas having temporally adjacent components assignable to two or more phases were then determined by examining the overlap or lack of overlap of dates assignable to discrete phases in that particular spatial area. The usual range of error for phase transition is 100 years. Extending the dates to 2 Sigma doubles the range in which the phase transition probably occurred.

While the above method may be open to question, I feel that given two clusters of dates with more or less consistent ranges assignable to terminal and initial components of two temporally adjacent phases, one can approximate within fairly precise limits (100 years) where the phase boundary may lie at 1 Sigma.

If dates are not available from temporally adjacent phases within an area, phase initiation is based on clustering of dates from components which seem to be the earliest dated in the area.

At the same time as the above manipulations are proceeding, dates which fall outside the 1 Sigma of the postulated phase boundaries are evaluated at 2 Sigma to see if their range falls within that of the other components assigned to the phase. They are also evaluated by applying the Polach-Golson test to determine if they are significantly different from dates accepted at 1 Sigma. If the Sigmas overlap and the Polach-Golson test does not indicate that they are significantly different and no other factors are operative which would make the determination suspect (contamination, intrusion, material dated) then the date is provisionally accepted at 2 Sigma.

If upon examination the date is found to lie outside the 2 Sigma range of other dates or the phase, it is usually not evaluated by the Polach-Golson test as the results will positively demonstrate a significant age difference between the two dates. The date is then examined at 3 Sigma range to determine if it fits. If it lies outside 3 Sigma it is rejected. Most dates whose true value must lie between 2 and 3 Sigma are usually rejected for a variety of reasons.

Given the sample size and the probabilities that a certain percentage of these determinations should have their true date falling outside 1 or 2 Sigma, one can further evaluate dates in terms of whether the ones which are unacceptable at 1 Sigma can be accounted for in terms of probability alone or if the date is a result of contamination, etc.

In the evaluation which follows, 29 dates were found to be unacceptable at 1 Sigma. Since by probability alone, 49 dates may have their true value outside 1 Sigma, some of the dates accepted at 1 Sigma may have their true values outside of this range. Of these 29 dates, 16 were found to be acceptable at 2 Sigma. Thirteen dates fall outside the acceptable 2 Sigma range, nine of which are outside 3 Sigma. Since no dates may have their true value falling outside 3 Sigma for the sample size of 155 dates, these nine may be rejected.

Probability indicates that seven dates may have their true value between 2 and 3 Sigma, suggesting that some of the dates accepted at 1 or 2 Sigma may have their true values in this range. The four dates where true date must lie between 2 and 3 Sigma are not accepted by application

of the Polach-Golson test.

A further six dates are not accepted at any range as a result of the application of the Polach-Golson test, sampling problems and stratigraphic associations.

For certain phases no radiometric determination are available. Dating of these phases in based on archaeological cross dating to dated components of other phases.

A final matter of concern is the validity of solid carbon age determinations. Table 25 lists 12 solid carbon dates which are available for components utilized in this thesis.

Because studies have shown that solid carbon determinations are not as reliable as those arrived at by other methods on duplicate samples, the wirter preferes not to accept these solid carbon dates. Deevey et al. (1959), in a study conducted on a Kaminaljuyu series, found that the Chicago solid carbon dates Libby (1955) ranged from slightly to significantly older than redated specimens. They also note:

> The impressions that the errors are systematic is probably an illusion, however numerous rechecks have shown that many solid-carbon dates (but relatively few of Chicago's) are too young, presumably owing to radioactive contamination, while other errors are small and random as to direction (Deevey et al. 1959:164).

Accepting the solid carbon dates does not alter the temporal control in the thesis. However, as more work is undertaken in the Northern Plains it may be that some of these particular components will lie at crucial temporal positions. A date which may be up to 500 years or more too early may result in a misinterpretation of the data.

As a final note, the question of significant systematic laboratory error arises with the respect to Geochron Laboratories Inc. as some Geochron dates have shown a consistent error. Aside from certain suspect Parker Phase dates (p. 285) all other Geochron dates seem as reliable as those from other laboratories.

PELICAN LAKE PHASE

Phase initiation is based on an evaluation of early Pelican Lake dates and adjacent Hanna Phase dates. Table 11 list five Hanna dates, of these only Long Creek S-63a and Tramp Deep are acceptable. McKean C-715 and Mortlach S-2 are solid carbon dates and S-63b is suspect because of cataloging errors (Wettlaufer 1960:137).

Unacceptable solid carbon Pelican Lake dates (Table 12) are: Cedar Canyon C-930, 931; Muddy Creek C-702, 711, and Poison Creek C-712. The Keaster GAK-1355 is also unacceptable. Acceptable early Pelican Lake dates are: Signal Butte L-385A, Happy Hollow GAK-884, Mummy Cave I-1075, DgPl-42 GX-1196, and Head-Smashed-In GAK-1474.

Evaluation of these dates, and the presence of a few Hanna points in Signal Butte II, DgPl-42 and Head-Smashed-In place the transition from Hanna to Pelican Lake points at ca. 1300 B.C. to 750 B.C. An approximate date of 1000 B.C. may mark the emergence of the Pelican Lake Phase.

Glendo Subphase

Fifteen dates from eight Glendo subphase sites relate to the Glendo Subphase (Table 12 No. 1). Of these dates only the Cedar Canyon solid carbon series is unacceptable. Acceptable dates place subphase initiation at ca. 1000 B.C. Early dates are Signal Butte L-385A, Lance Creek A-364, and Happy Hollow GAK-884. Intermediate dates are Happy Hollow GAK-1302, Uhl GXO-321, and 48PL23 M-972. Late dates for Glendo in northeastern Colorado are Uhl GXO-322, and 320. A late date in southeastern Wyoming is 48PL24 I-599.

Subphase termination in northeastern Colorado is indicated by the Parker Phase dates: Uhl GXL-319, Hutcheson GXO-, and Michaund A GXO-529 (Table 29). These, plus the Uhl Glendo Subphase dates, place the Glendo-Parker Interphase boundary at 150 B.C.-A.D. 175 to 75 B.C.-A.D. 475 (2 Sigma) or 100 B.C.-A.D. 90 to A.D. 50-250 (1 Sigma). Evaluation of other data indicates that the temporal boundary should be placed at A.D. 300-400.

Badger Subphase

Four dates from four components are relevant to the dating of the Badger Subphase (Table 12 No. 2, Table 14 No. 3). The Sitting Crow date I-447 is quite acceptable. The other three dates may have ceramic associa-

tions and could date early ceramic components. The Tramp Deep dates are evaluated and rejected in the Loseke Phase section. A discussion of the Badger component date and association follows.

Three ceramic varieties were found in the Badger component: 1.) Group A--Plain Great Oasis; 2.) Group B--undecorated, calcite-grit tempered, with exterior diagonal cording; 3.) Group C--vertical fine corded ware wtih notched stick indentations on the outer lip-upper rim. Group B, though it has calcite temper, should not be typed as Harlan Cord roughened, for diagonal cord roughening is not present on the calcite tempered Keith Phase ceramics. It appears occasionally on sand or grit tempered ceramics in components assigned to Keith and also on Valley and Loseke ceramics. Group C is similar to Weaver Ware (Neuman 1964b:311) which dates from A.D. 400-700 (Eyman 1967:Fig. 2). The decorative technique compares to a Scalp Punctate sherd from Gavins Point (Howard and Gant 1966). Neuman (1964b:311) also notes that the same type was found at 39BR11, twenty miles downstream from the Good Soldier Site. Since Early Woodland components characterized by Black Sand Incised, Marion Thick, and Jackson Wares are present in southwestern Minnesota, we would expect the associated ceramics in Badger to be Early or Early Middle Woodland types if the date is correct. However the associated ceramics are all later in time than Early Woodland types, suggesting that either the date or the ceramic association is incorrect. Since the Badger component contained typical Pelican Lake excavated rock-filled hearths besides earth-filled hearths we might well assume that these, plus the lithic tools, represents a preceramic Pelican Lake component rather than a ceramic component since rock-filled hearths are absent in Valley or Loseke. However, since the lithic assemblage is also similar to that in Loseke, except that one might expcet a few Besant Side Notched points in association with the Pelican Lake Corner Notched, the date may be incorrect and the component should date ca. A.D. 200-500. Until further data are available, I feel the component is best interpreted as preceramic with which later ceramics have become associated through mixing with undefined later components. The two dates, Badger and Fort Thompson, fall within the middle temporal range of the Pelican Lake Phase and are

of little value in determining the duration of the phase in time. Phase initiation, as indicated by the Hanna date from Tramp Deep (Table 10), is placed at ca. 1000 B.C. The Badger-Valley Interphase boundary is placed at ca. A.D. 1-100 (ibid:374).

Upper Miles Subphase

One date, Upper Miles GAK-1503, is available for the Upper Miles Subphase (Table 12 No. 3). The date is considered acceptable. The McKean date (Table 10) may apply to the Upper Miles rather than the Hanna component at the McKean site. As discussed elsewhere this component includes a number of temporally discrete occupations.

Phase initiation is placed at 1000 B.C., utilizing the Ruby Besant date (Table 12), the Upper Miles-Besant Interphase boundary is placed at A.D. 100-200. This date is substantiated by the presence of Besant style ceramics in Mule Creek B which would place that component at ca. A.D. 100 or later.

Spring Creek Subphase

Ten dates from ten components are available for the Spring Creek Subphase (Table 11 No. 4). The only unacceptable dates are the solid carbon dates C-702, 711, and 712. The Mummy Cave date I-1427 indicates phase initiation at ca. 1000 B.C. The late dates from Bottleneck, Spring Creek, Ten Sleep, and Wedding of the Waters; and the Todd Phase SI-103, I-1009, and I-690 dates (Table 19) place the Spring Creek-Todd Interphase boundary at A.C. 500-600.

Keaster Subphase

Five dates from three sites are available for the Keaster Subphase (Table 12 No. 5). The three dates from Keaster are not all acceptable as both dates GAK-1355 and GX-1194 from Level 1 are earlier than the Level 3 determination W-1366.

Obsidian hydration dating (Davis pers. comm.) indicates that the GAK-1355 date is unacceptable. This is substantiated by application of the Poloch-Golson test, and the fact that the true date for this deter-

mination must, if we accept the other dates, be outside its 2 Sigma range which is highly improbable. The sample, which was taken from a burned post must be contaminated. W-1366 from Level 3 and GX-1194 from Level 1 are provisionally accepted. Application of the Poloch-Golson test indicates that they are not significantly different suggesting that the stratigraphic unit containing the three cultural levels was deposited in a brief period of time; however, Level 3 should be redated.

Phase initiation for Keaster is placed at 1000 B.C. The Keaster-Besant Interphase boundary in northern Montana predates the 24HL101 Besant date (Table 12) and postdates the Keaster dates. Evaluation of the evidence for adjacent regions places this boundary at A.D. 100 to 200.

The Eagle Creek date in southern Montana, WSU-396, is acceptable only in the lower portion of its 2 Sigma range; as obsidian hydration data and other evidence indicate the presence of Avonlea points on the Upper Yellowstone Valley by A.D. 500-600. On the adjacent plains the Stark Lewis date indicates that phase termination is probably later than A.D. 200-A.D. 300. Obsidian hydration data (Davis pers. comm.) places Stark Lewis Level 2, a Keaster component at A.D. 360, suggesting that the Keaster-Besant, Keaster-Avonlea Interphase boundaries occur at A.D. 500-600.

Blue Slate Canyon Subphase

Two dates from DgPl-42 are available for dating the Blue Slate Canyon Subphase (Table 12 No. 6). GX-1196 dates the earliest component at the site. This date in addition to obsidian hydration data (Davis pers. comm.) suggests a date of ca. 1000 B.C. for the Hanna-Blue Slate Canyon Interphase boundary. GX-1272 dates the latest Blue Slate Canyon component at DgPl-42.

The Blue Slate Canyon-Besant Interphase boundary is place at A.D. 250-350 in the Avon quarry area. This placement is based on the extensive utilization of Avon chert in Kenney Layers 6 and 8. The latter dates A.D. 350 $\pm$ 120 (S-272) (Table 13). Since the Besant Phase does not seem to represent a discrete occupation in the Waterton area, the GX-1272 date probably dates the Blue Slate Canyon-Avonlea Interphase boundary at ca. A.D. 500-600.

Mortlach Subphase

Six dates from four sites are available for Mortlach Subphase components (Table 12 No. 7).

Obsidian hydration data indicate that the Old Women's date of A.D. 110 ± 75 (S-91) must be rejected. Layer 25 also contains some points which are identical to those typed as Hanna from the dated early level at Head-Smashed-In. With the exception of Long Creek S-49b, all other Mortlach Subphase dates are acceptable. S-49b is too early and suspect because of possible cataloging errors (Wettlaufer 1960:137).

Based on the Long Creek Hanna date S-63a (Table 10), and the Head-Smashed-In GAK-1474 date, Mortlach phase initiation is placed at 1000 B.C. While only one acceptable late Mortlach date (GX-1253) is available, evaluation of early Besant dates S-90, 200, and 272 (Table 13), and other data place the Mortlach-Besant Interphase boundary at A.D. 150-250. Evaluation of early Avonlea dates S-255, GAK-1475, GX-1252 (Table 14), and other data place the Mortlach-Avonlea Interphase boundary at A.D. 150-250.

Larter Subphase

Chronological placement of the Larter Subphase is based entirely on archaeological considerations as there are no radiocarbon dates available. Considering the intensity of archaeological research in Manitoba in recent years the general lack of radiocarbon dates in southern Manitoba is very unfortunate.

MacNeish (1958) dates the phase between 1500 B.C. and 500 B.C. Based on cross dating I place phase initiation, i.e. dominanace of Pelican Lake Corner Notched points, at ca. 1000 B.C. While Hanna points are not reported as such, one illustrated specimen of Larter Tanged resembles a Hanna point (MacNeish 1958:Pl. 6, No. 9).

Phase termination of Larter in the Parklands depends on the temporal placement of the Laurel Phase (Anderson and Nutimik). Wright (1967:75) does not accept any of the published B.C. dates for Laurel. Further, he (Wright 1967:107) considers MacNeish's Anderson, and Nutimik Phases to be late in the Laurel Tradition. Until absolute chronological control is available I shall, for the purposes of this thesis place Larter-Anderson

Interphase boundary at ca. A.D. 1 in the Parklands. In the southwestern Manitoba area the two Besant dates (Table 13) indicate that Larter predates A.D. 600. Until additional dates are available I place the Larter-Besant Interphase boundary at A.D. 1-100.

BESANT PHASE

North Dakota-South Dakota-Middle Missouri

Eleven dates from eleven burial mounds (Table 13 No. 1a) and one habitation, Porcupine Creek (Table 13 No. 1b), are available for this area. Of these twelve dates, only SI-167 is immediately rejected for it postdates all the other mound dates, and it is improbable that its true value lies within its 3 Sigma range, as it is only acceptable at the bottom end of this range. The other eleven dates, with the exception of I-414, form an internally consistent series.

Pelican Lake Phase dates are lacking for the immediate area. Consequently the Pelican Lake-Besant Interphase boundary cannot be bracketed. I-414 is earlier at the 1 Sigma range than the other mound dates, SI-311, I-497, and I-718. Assuming these dates represent the beginning of mound construction, phase initiation is placed at A.D. 1-100. I-414 is then accepted only in the upper portion of its 2 Sigma range.

Termination of Besant or a temporally derivative phase can only be suggested as data on post-Besant pre-Fort Yates components is not available. The latest burial mound date A.D. 610 ± 150 (I-498) places termination of mound construction at no later than A.D. 750 (1 Sigma). Evaluating the burial mound dates as a group, termination of construction may be placed at ca. A.D. 500. The only Fort Yates Phase date available is A.D. 1230 ± 80 (SI-213) from the Fire Heart Creek site (Lerhmer 1966). Whether or not earlier manifestations of the Middle Missouri Tradition occur in the area is not determinable. Evaluation of Initial and Extended Middle Missouri Tradition occur in the area is not determinable. Evaluation of Initial and Extended Middle Missouri dates (Table 23), and Mill Creek dates (Table 24), place initiation of the Middle Missouri Tradition at A.D. 900-1000. If earlier components of the tradition than Fire Heart Creek

are present in the Besant Phase area they may be assumed to date no earlier than A.D. 900-1000.

Since Loseke-like (cord impressed) ceramic materials have not been described for the Besant Phase area, we may assume that, if post A.D. 500-750 Besant components do exist, they will still be characterized by the punctated bossed ceramics and possibly Samantha or side notched arrow points. For lack of evidence to the contrary I suggest that the Besant Phase or a derivative phase of the NAPIKWAN Cultural Tradition in this area will terminate anywhere from A.D. 500 to A.D. 900-1000.

Belle Fourche-Powder River

One date, GX-1157 (Table 12 No. 27), is available for the Powder River area. Evaluation of this date places phase initiation at A.D. 100-200. Phase termination, while not controlled by absolute dates, is indicated by the presence of both types of Avonlea points in the Avonlea Phase components in the area, suggesting a terminal date of A.D. 400-500 for Besant.

Upper Missouri

Four dates from three Besant Phase sites are available for this area (Table 13 No. 3). Of these dates GAK-1504 is unacceptable as it post-dates at 2 Sigma all acceptable Besant dates in the Northern Plains and it is improbable that the true value will be found in the bottommost portion of its 3 Sigma range.

The two dates from the Leavitt Site require evaluation as application of Poloch-Golson test (1960:19) indicates fair probability that the dates are significantly different. Samantha points appear in Layer 14b at the Old Women's Buffalo Jump (ca. A.D. 700-800) and in terminal Avonlea components at Head-Smashed-In ca. A.D. 700; we may, on this basis, accept the Leavitt GX-1212 date and reject GX-0147. It should also be noted that GX-0147 is a mcuh earlier collagen determination and Krueger (pers. comm.) feels that GX-1212 is a much better determination.

Since 24HL101 contained no Samantha points, the component must be earlier than Leavitt. The 24HL101 date, GAK-1506, is therefore only

acceptable in the bottom portion of its 2 Sigma range, i.e., A.D. 450-650.

Besant Phase initiation must postdate the Keaster dates. I suggest that it be placed at A.D. 100-200. Phase termination of Besant by Avonlea is bracketed by the Leavitt and Timber Ridge (Table 14) A.D. 970 ± 110 (GX-1195) dates. A date of ca. A.D. 750-800 is suggested.

In southern Montana, Stark Lewis Level 1A, a Besant component, has an obsidian date of ca. A.D. 700 (Davis pers. comm.).

Saskatchewan Basin

Twelve dates from nine Besant components (Table 13 No. 4), and eleven dates from ten Avonlea components (Table 14 No. 2) are available. These two groups of dates parallel each other through time and can best be explained by considering the Besant and Avonlea phases as representing separate cultural traditions. Otherwise a large number of dates from each group plus other stratigraphic and cultural data would have to be rejected. If we found a layer cake sequence of Pelican Lake, Besant, and Avonlea, the Avonlea dates--S-255, GX-1252, and GAK-1475--and the Besant dates--GX-1192, 1189, 1212, GSC-696, and GX-1193--would be unacceptable. In such a sequence we would date Besant between A.D. 250-300-A.D. 500, and Avonlea A.D. 500-700. At Old Women's the stratigraphic break would be placed bewteen 14b and 13 rather than between 14b and 15. However the 14b assemblage shows good continuity into 13 (Old Women's Phase). Samantha points appear only in late Besant components in any number, i.e. Richards, Old Women's Layer 14b, and Leavitt. They also appear in the upper Avonlea components at Head-Smashed-In. These components date ca. A.D. 700-750. Consequently, I feel that these must be conceptualized as separate cultural traditions coexisting in time-space in the Northern Plains.

The Kenney Layer 6 date S-271 is unacceptable as the layer has been redated at A.D. 490 ± 110 (GAK-1354). The latter determination fits the archaeological evidence, indicating that the true value for S-271 would have to be outside its 3 Sigma range which is impossible. The latter fits both the stratigraphic and archaeological evidence. The Morris Church date S-120 is also unacceptable as it postdates early Old Women's Phase

dates in Saskatchewan (Table 21 No. 2). The Mortlach date S-22 is solid carbon and consequently rejected.

The Head-Smashed-In date, A.D. 490 ± 90 (GX-1220), presents something of a problem. Stratigraphically, in the same excavation unit, it postdates a date from the Avonlea level above A.D. 305 ± 130 (GX-1252). However application of the Poloch-Golson test indicates that the dates are not singificantly different. If, however, we test GX-1220 against GAK-1475 (A.D. 90 ± 120), which is from an Avonlea level equivalent or slightly earlier than that of GX-1252, we find they are significantly different. We may interpret this to indicate that either GX-1220 or GAK-1475 is incorrect. Application of the test to GX-1252 and GAK-1475 indicates they are not significantly different--suggesting that GX-1220 is the unacceptable date. This conclusion is substantiated by comparison to the initial Gull Lake Avonlea date A.D. 210 ± 60 (S-255). Consequently the three early Avonlea dates GX-1252, GAK-1475, and S-255 are accepted. Evaluation of these dates suggests phase initiation for Avonlea should be placed at A.D. 150-250.

Phase initiation for Besant is indicated by the Kenney Layer 8 A.D. 350 ± 60 (S-272), Old Women's A.D. 300 ± 60 (S-90), and Walter Felt A.D. 354 ± 70 (S-200). These dates, plus the stratigraphic evidence at Head-Smashed-In, suggest a date of A.D. 150-250 for initiation of the Besant Phase in the Saskatchewan Basin.

Intermediate Besant dates are Kenney Layer 6, A.D. 490 ± 110 (GAK-1354), Walter Felt Layer 10, A.D. 415 ± 80 and ± 90 (S-201, 260), DlPk-3 A.D. 520 ± 105 (GX-1189), and Muhlbach A.D. 680 ± 150 (GSC-696). The Besant-Old Women's Interphase boundary is bracketed by these dates plus early Old Women's Phase dates (Table 21) of A.D. 785 ± 80 (S-150) and A.D. 730 ± 80 (S-149) from Gull Lake; A.D. 690 ± 70 (S-202) from Walter Felt and A.D. 930 ± 80 (S-89), A.D. 850 ± 80 (S-87) from Old Women's. Evaluation of these dates suggests that the interphase boundary may be placed at ca. A.D. 750.

Southwest Manitoba

Internally we are unable to evaluate the two dates (Table 12 No. 5),

as these are the only available radiocarbon dates from southern Manitoba. The Richards Kill date A.D. 710 ± 130 (GX-1193) overlaps with both Muhlbach (GSC-69) and 24HL101 (GAK-1504). The latter two are characterized by Besant; Richards has in addition Samantha points. The date compares favorably with Leavitt and Old Women's 14b. The Richards date overlaps with the other Manitoba date--Calf Mountain A.D. 845 ± 85 (GX-1192). Provisionally, until other dates are acquired on adjacent phases, these two will be accepted. Since some of the Manitoba mounds are very similar to Besant mounds we may place phase initiation at A.D. 1-100. Phase termination by the Manitoba Phase is tentatively placed at A.D. 900-1000. This is based on radiocarbon dates for Black Duck ceramics in areas adjacent to Manitoba (Johnson 1964).

AVONLEA PHASE

Saskatchewan Basin (Table 14 No. 1)

Phase initiation of Avonlea has previously been discussed. It is placed at A.D. 150-250. Three acceptable dates--Gull Lake A.D. 210 ± 60 (S-255), Head-Smashed-In A.D. 305 ± 130 (GX-1252), and A.D. 90 ± 120 (GAK-1475)--relate to this determination. Another date from Head-Smashed-In, GX-1399, A.D. 615 ± 95--from equivalent levels--is rejected be application of the Poloch-Golson test. Further accepting the other early dates means that the true value for GX-1399 would have to lie outside its 3 Sigma range which is impossible.

Intermediate Avonlea dates are Avonlea A.D. 450 ± 100 (S-45) and Garratt A.D. 500 ± 70 (S- ?). Avonlea dates which relate to the terminal Avonlea-Besant Interphase boundary are DlPk-3 A.D. 625 ± 120 (GX-1190), Gull Lake A.D. 660 ± 60 (S-254), Garratt A.D. 670 ± 70 (S- ?), and Head-Smashed-In A.D. 620 ± 85 (GX-1251), although GSC-983 A.D. 940 ± 120 from a lower level than GX-1251 at Head-Smashed-In is rejected as probably unacceptable by the Poloch-Golson test. It may provisionally be accepted in its lower 2 Sigma range.

The initial dates of the Old Women's Phase (Table 21), serve to define the termination of Avonlea in the Saskatchewan Basin at ca. A.D. 700.

Upper Missouri (Table 14 No. 2)

Only one date A.D. 970 ± 110 (GX-1195) is available for northern Montana Timber Ridge. Although this date is later than Avonlea dates in the adjacent Saskatchewan Basin it compares favorably with the Todd Phase Mangus dates A.D. 900 ± 70 (SI-99) and A.D. 880 ± 70 (SI-100). These components contain Avonlea points. Until more dates are available in northern Montana the Timber Ridge date will be provisionally accepted in the lower 1 or 2 Sigma range, i.e. A.D. 760-860.

Phase initiation for Avonlea in northern Montana is provisionally placed at A.D. 400-500 as I find this to be an acceptable time for initiation of the phase in the Belle-Fourche-Powder River area. Phase termination utilizing a single date is placed at A.D. 900-1000.

In southwestern Montana phase initiation is placed at A.D. 500-600. Avonlea points are present in the Todd Phase Sorenson component which dates A.D. 640 ± 100 (I-690) indicating this estimate to be approximately correct. On the basis of obsidian hydration data, phase termination by components containing tri-notch points is placed at A.D. 900-1000.

Belle Fourche-Powder River-Black Hills

Although no absolute chronological control exists, phase initiation, on the basis of the presence of both Head-Smashed-In Corner Notched and Timber Ridge Side Notched in components in this area, may be placed at A.D. 400-500. The Keyhole Phase as marked by the innovation of Scallorn points is placed at A.D. 500-600 for the Belle-Fourche area. However the PK burial date, if it is Avonlea, may indicate that the Avonlea Phase lasts as late as A.D. 900-1000 in the Powder River area.

VALLEY AND LOSEKE CREEK PHASES (Table 15)

Valley

One date, VY-1 1780 B.C. ± 300 (M-182), is available for the Valley Phase. This date is unacceptable as the ceramic assemblage at Valley is Middle Woodland and consequently would not predate 300 B.C. Initiation of the Valley Phase must be based on cross dating to dated components as dated preceramic components are lacking in the immediate area. The two

Badger Subphase dates (Table 11 No. 2) indicate that in that area of the Missouri River ceramic components do not predate ca. 250 B.C. Evaluation of the evidence--Besant Side Notched points in Valley, similar ceramics to Besant in Valley, and the presence of Hopewellian decorative techniques in some Valley sites--suggests a date of A.D. 1-100 for initiation of the Valley Phase.

No dating control exists on terminal Valley components to date the Valley-Loseke Interphase boundary. However, evaluation of the Arp dates suggests a date of A.D. 500-600 for this transition.

Loseke Creek Phase

Thirteen dates from nine sites are available for components assigned to the Loseke Creek Phase (Table 15 Nos. 2 and 3). Seven of these dates are from burial mounds which are only tentatively assigned to the phase.

The two dates (I-1308 and I-1309) from Tramp Deep are not acceptable for the associated ceramics are described as Ellis Cord Impressed (Howard and Gant 1966). Evaluation of the available radiocarbon dates indicates this type appears at A.D. 500-600 on the plains. One might reasonably assume that any ceramics found associated at this early time level should resemble Early Woodland wares such as Marion Thick, Jackson Fabric Impressed, or Black Sand Incised since those types are present in southwestern Minnesota.

Level II, which underlies Level III at Tramp Deep, is supposedly preceramic. The lack of ceramics in Level II is not considered significant as only four sherds were found in Level III. [The exact number of sherds found may be four or five (Howard and Gant 1966:22). It is stated that five were found, elsewhere 4 are said to be found (ibid:45, 46)]. The radiocarbon dates are also quite close and only five inches separated the two levels.

A shaft smoother was found in Level III (Howard and Gant 1966:22); it is not described. Present data indicate that regular boat-shaped shaft smoothers do not predate the Avonlea Phase and first appear on the Missouri in the Loseke Creek Phase.

The stratigraphy of the site also supports a rejection of the dates:

in accepting the date on Level I, ten feet of deposits would have occurred in five hundred years between Level I and II-III; since only five feet overlie Level II, this would imply a change in the depositional rate in the order of ten times. Since deposition is alluvail, colluvial and aeolian, one would expect changes in rates as the deposit built up; reassigning a date of A.D. 500-800 for Levels II and III provides a much more acceptable rate of change. Finally, it should be noted that, although the authors do not describe them as such, there seems to be two or three buried soils between Levels I and II which would imply surface stability at different periods of time.

The series of six dates from the Arp site (Table 25 No. 3; Table 23 No. 1), which was a physically undifferentiated occupation containing both Loseke Creek (Scalp Punctate, Ellis Cord Impressed, etc.) and Over (Chamberlin Incised, Stuart Collared Rim, etc.) ceramics, should provide good temporal control on the Loseke Creek and the Loseke Creek-Over Interphase boundary.

Gant (1967:63) separates the dates into two groups which presumably date the two ceramic components; M-1415, M-1417, M-1414, and M-1420 associate with Woodland ceramics for which he assigns a date from A.D. 420 to 810; and M-1413 with Over--A.D. 1020 to 1160. Gant does not assign M-1411 to the latter. However, it presumably has been utilized as the terminal bracket date since A.D. 1160 is the mean date for M-1411.

Gant (1966:27, 28, 32, 36, 63) states that these dates are in association with the respective ceramics. However, the dates were obtained from features (hearths or cache pits), and the description of the contents of these features (ibid:12-21) does not fully correspond to Gant's stated associations (presumably that these associations occurred in the features themselves). The features from which M-1414, 1415, and 1420 were obtained contained no diagnostic artifacts according to the feature descriptions. M-1417, which is stated (ibid:27, 61, 63) as from Unit 7, Feature 3, and described (ibid:19) as having been obtained from Unit 7, Feature 24, contained "a variety of Scalp Punctate." Feature 3 contained "Fragments of a Chamberlain Incised Vessel" (ibid:14). M-1414 is described (ibid:27,

61, 63) as from Unit 5, Feature 9, which is described (ibid:15) as containing no diagnostic artifacts and was found in Unit 3 rather than Unit 5. However, M-1414 is said to have come from Feature 28 which contained a fragmented Scalp Punctate vessel (ibid:17). Since evident confusion seems to exist over where M-1414 and M-1417 are from, one might well wonder about M-1415 and M-1420 which are also assigned to the Woodland component.

M-1413, assigned to Over component, is state (ibid:32, 61, 63) to be from Test 7, Feature 1. Feature 1 is recorded for excavation Unit 1 rather than Test 7 and contained "rim sherds exhibiting horizontal cord impressed decoration" (ibid:12). Feature 27 from Unit 9 contains the Over ceramic types with which the date is presumably associated. M-1414, assigned to Over Focus, is a composite sample from the cultural level.

It is evident that considerable confusion seems to exist, consequently the dates and stated associations must be cautiously accepted. The cultural level is stated as being 6" - 14" thick (ibid:11), a thickness in which no internal stratigraphy could be observed. For example in Table IV, which supposedly shows the ceramic distribution, scalp punctate was found from 12" - 66" in depth. However, the cultural level is supposedly nowhere this thick. If there was any internal stratigraphy in terms of sherd frequency or natural stratigraphy it is not demonstrated in this chart.

The hypothesis presented by Gant that it is a two component site seems based on two assumptions:

(1) Clustering of radiocarbon dates--i.e., A.D. 420-810 for Woodland and A.D. 1020-1160 for Over. This clustering is based on using the mean age which is an invalid technique.

Of the purported Over component dates, M-1411 is a composite sample taken from the cultural layer. Since the dates from the cache pits show a substantial temporal range any composite sample is extremely suspect and must be rejected. The other Over date, M-1413, has a 1 Sigma range of A.D. 910-1130. Associated ceramics (the number of Over sherds present is not stated) included nine Woodland type sherds. This association alone suggests that the site does not have two discrete components each characterized by separate ceramic types, but that the site represents a series of stratigraphically undifferentiated, culturally related, components of

which the earlier may have been characterized by Scalp and Ellis and the later by Over ceramic types. On this basis one may evaluate the dates as a continuous series.

(2) The implicit assumption that Initial Middle Missouri as represented by the Over Phase (focus), is not related to the earlier "Woodland" ceramic phases. Gant (1967:54) states that although he places a 350-year separation between the "two clusters" the major differences between the two ceramic groups lies in the decorative treatment of the rim-lip, and (ibid:54) "both" components are characterized by vessels which are vertically cord roughened and an elongated globular to almost a shortened conoidal shape.

> Considerable continuity in artifacts does exist, suggesting that there was contact between the two components. Evidence seems too scanty if not altogether lacking to support any contention that the two groups were living together at the site as the stratigraphic evidence would suggest (ibid:55)

To my mind such a muddy statement is viewing prehistory, not through a keyhole but through a smoke hole.

While I have no intention herein to discuss the relationships between "Plains Woodland" and Initial Middle Missouri, I would suggest that the evidence from such sites as Arp and Hitchell (Johnson 1967) indicates continuity between the two--in the ceramic and lithic assemblage.

Valley and Besant ceramics are characterized by conoidal vessesl with unconstricted necks and a poorly defined shoulder. Sites, or components thereof, containing ceramics with constricted necks and shoulders are therefore later in time than Valley. While no acceptable dates are available for Valley the Besant dates indicate the continued use of the older vessel form until A.D. 500. The ceramics from the White Swan Site (A.D. 525 $\pm$ 110 (I-561)) are described as "two small vertically elongated pots which bear a slight resemblance to some of the pottery from the Sterns Creek component" (Cooper 1949:309). The dates on Truman Plain Rim which is simply stamped with a poorly defined shoulder at the Side Hill Mound is A.D. 750 $\pm$ 80 (I-448).

The projectile points at Arp postdate Porcupine Creek, Stelzer, and

Valley. The above evidence suggests a date of ca. A.D. 500-600 for initiation of the Loseke Creek Phase.

M-1415 is accepted in its upper 2 Sigma range. M-1417, M-1414, and M-1420 form a tight nonsignificant cluster of dates. These give a tight overlapping temporal range from ca. A.D. 550-650 to A.D. 925. M-1413, associated with both Over and Woodland, overlaps at the lower part of 1 Sigma. Application of the Poloch-Golson test shows it to be significantly different from the preceding group. Comparing it to pure Over Phase (foci) dates, Swanson (M-839) date, and Cow Creek (M-836) date, (Table 23) suggest a pre A.D. 900-1000 date for terminal occupation at Arp and acceptance of M-1413 in the lower 2 Sigma range. Occupations at the Arp Site are consequently placed between ca. A.D. 500-600 to ca. A.D. 900. Based on an evaluation of Loseke, Initial Middle Missouri dates (Table 23), Central Plains Phase and Mill Creek dates (Table 24) termination of the Loseke Creek Phase is placed at ca. A.D. 900-1000.

KEITH PHASE

Five dates from five components are available for the Keith Phase (Table 16). Of these five, Woodruff (C-928) is a solid carbon date and thus considered unacceptable.

The Massacre Canyon date 130 B.C. ± 250 (M-181) is acceptable only in the upper portion of its 2 Sigma range for the component contains Parker Corner Notched arrow points and as discussed elsewhere the earliest acceptable date for these is A.D. 300.

The Pelican Lake-Keith Interphase boundary can only be approximated as late preceramic components and early Keith components have not been dated. The presence of atlatl points and a rocker roughened sherd at Pottorff suggests a date of A.D. 200-300. The other Keith dates--25FT18 A.D. 370 ± 100 (SI-126), A.D. 820 ± 100)M-841), and 25RW8 A.D. 530 ± 45 (SI-69)--are acceptable. M-841, plus an evaluation of Upper Republican Phase (Table 22) and Central Plains Phase (Table 24) dates, places phase termination for Keith at A.D. 900-1000.

PARKER AND ASH HOLLOW PHASES

Parker

Thirteen dates from ten sites are available for the Parker Phase (Table 17 No. 1). Three of these are from aceramic burials assigned to the Parker Phase.

The dates fall into two groups: (1) GXO-319, 529, whose 1 Sigma range is from ca. A.D. 50-250; and (2) those dates which range from ca. A.D. 350-400 to A.D. 1100. Application of the Poloch-Golson test indicates that the LoDaisKa determinations are not significantly different. Acceptance of the first group of dates and evaluation of these with the Uhl Glendo Subphase dates (Table 28) would place phase initiation in northeast Colorado at ca. A.D. 1-100.

In contrast, the second group of dates places phase initiation at ca. A.D. 300-500 for the Denver Basin and A.D. 400-500 for the adjacent foothills. If we accept this evidence at face value it means either that the earliest components in the Denver Basin adjacent to the foothills have not been dated or that there is a time lag of some 200 years between initiation of the Parker Phase in northeastern Colorado and the initiation in the Denver Basin and adjacent foothills.

Evaluation of the following evidence suggests to me that the early dates from northeastern Colorado are invalid except in the upper part of their 2 Sigma range, i.e. A.D. 300-400.

(1) The Parker Phase ceramics most closely resemble those of the Keith Phase. Evaluation of the evidence for Keith places phase initiation at A.D. 200-300. If correct, innovation of ceramics by Parker Phase populations would not occur prior to this time.

(2) Parker Corner Notched points are formally related to Rose Spring Corner Notched, which are innovated A.D. 400-600 in the Great Basin (Clelow 1967), Basketmaker III A.D. 400-700 (Willey 1967:202), Columbia Valley Corner Notched, and Fremont variations like those present in Level 4 at Deluge Shelter A.D. 735 $\pm$ 85 (GXO-895) (Leach 1967:Type 2g, 4f). This form is absent in the earlier level 5, dated at A.D. 355 $\pm$ 95 (GXO-896). Consequently, unless the form is earlier in northeastern Colorado, it should not predate A.D. 400. Further, Parker Corner Notched are arrow points,

the earliest of which--on the Plains--are Avonlea and date A.D. 150-250. Consequently, unless independent invention introduced the bow and arrow into the Parker Phase, they cannot at a maximum predate Avonlea.

(3) Certain of the early Geochron dates may be 400-500 years too early. Sanger (1967:Table 1) lists two groups of dates; within each group the Geochron dates are 400-500 years earlier than determinations run by the Geological Survey of Canada and Isotopes on the same field sample. [See also comments on GX-316, 357, and 358 (Krueger and Weeks 1966:149-52)]. It should be noted that the Uh. sample number GX-318 falls within this group and may therefore be suspect. Since neither Michaund A nor Hutcheson contain ceramics, their association with the Parker Phase may not be correct.

Ash Hollow

Only one date is available for the Ash Hollow Phase--Kelso A.D. 800 ± 200 (M-637) (Table 17 No. 3). The presence of side and tri-notch points in components assigned to this phase suggests a relatively late date of ca. A.D. 500-1000 depending on the source of innovation. If the forms are being innovated from Loseke a date of ca. A.D. 500-800 would be in order. If coming from Upper Republican, a date of A.D. 900-1000 would be correct.

Phase termination for Ash Hollow and Parker in the plains is placed at A.D. 900-1000 based on available Upper Republican dates from Colorado (Table 22 No.2). In the Denver area phase termination by the Franktown Phase is placed at A.D. 900-1000, (Table 22 No.3). In the Foothills-Mountains Intermontane pottery appears at about this time (J. J. Wood 1967:639-640).

PATTEN CREEK PHASE

Three dates from two sites are available for the Patten Creek Phase (Table 18). Data are not available on the association of the two Patten Creek dates with the site; consequently they cannot be accepted. M-971 is considered an acceptable date. The 48PL24 Upper component contained both atlatl and arrow points suggesting that the Glendo-Patten Creek Interphase boundary should be placed at A.D. 400-500. The Lee and 48PI23 dates

(Table 22 No. 4) are from aceramic components containing side and tri-notch points, and suggest a terminal date for Patten Creek of A.D. 900-1000.

KEYHOLE PHASE

No dates are available for the Keyhole Phase. Cross dating the Scallorn point type to Patten Creek, plus the presence of Avonlea components in the area, suggests an initial date of A.D. 500-600. Termination, as marked by the appearance of side notched and tri-notched points, is placed at A.D. 900-1000.

TODD PHASE

Six dates from five sites are abailable for the Todd Phase (Table 19). Evaluation of early Todd dates--SI-103, I-690, and I-1009--and the Spring Creek dates--place the Spring Creek-Todd Interphase boundary at A.D. 500-600. Phase termination, as marked by the innovation of side notched and tri-notched points, placed at A.D. 900-1000. This date is indicated by the Mangus dates A.D. 900 $\pm$ 70 (SI-99) and A.D. 880 $\pm$ 70 (SI-100). The Turk burial date is accepted only in the lower part of its 2 Sigma range.

WILLOWBROOK PHASE

Four radiocarbon dates from two sites (Table 20) are available for this phase. Application of the Poloch-Golson test to M-1004 and M-1006 indicate that it is fairly probable that the dates are significantly different, suggesting that M-1004 should be rejected.

Application of the Poloch-Golson test to the two Willowbrook dates indicates they are significantly different and that one, probably GXO-528, should be rejected.

Phase initiation, utilizing the acceptable LoDaisKa date, is placed at 1400-1000 B.C. Phase termination, utilizing Parker Phase dates, is placed at A.D. 400-500.

CHRONOLOGICAL AND CULTURAL ASSIGNMENT OF PRIMARY FLEXED BURIALS IN THE SOUTHWESTERN AREA OF THE NORTHERN PLAINS

Inherent problems exist in the chronological and cultural placement

of the primary flexed burials in this area because most lack phase diagnostic artifacts and few are dated. For most burials the following placement must be considered as only tentative.

Glendo Subphase (Table 1) and
Patten Creek (Table 9) Phases

The only chronologically controlled component assigned to the Glendo Subphase is the Witken burial (Table 26). The 39FA30 burial is assigned to the Glendo Subphase for, while it lacks temporally diagnostic artifacts, it probably associates with the Glendo Subphase component rather than with the later Upper Repulican component at the site, since Republican elsewhere has a distinctive burial pattern. Since the Laramie and Silver Springs burials are similar to the 39FA30 burial, they are provisionally assigned to the Patten Creek Phase. Since Mahoney contains Parker Corner Notched points it may be definitely assigned to Patten Creek.

Parker Phase Burials (Table 7)

The Magic Mountain A burial was in the Parker Phase level and it may definitely be assigned to Parker. Magic Mountain B is assigned to Willowbrook. Chronologically controlled, Hazelton Heights (Table 28 No. 1) is assigned to Parker. Michaund A, which probably associates with a ceramic component at the site (J. J. Wood pers. comm.), and Hutcheson, are assigned to Parker.

Glendo and Parker

The phase assignment of the remaining six components--Gakagan-Lipe, Howard-Rollin, Young, Bisterfeldt, 25SF10, and Huffman--is somewhat more difficult. In the assignment of these components one must consider certain Parker Phase features; such as ceramics, and bow and arrow technology. Since ceramics do not occur in the burials directly assignable to Parker it cannot be used as a phase diagnostic. Taking the presence of atlatl technology to be indicative of the Glendo Subphase we could then assign Huffman, 25SF10, Bisterfeldt, and Gakagan-Lipe to Glendo as they all contain atlatl weights.

The first three also contain Pelican Lake Corner Notched atlatl points which substantiates an assignment to the Glendo Subphase.

Young, which contained one atlatl point--probably a Besant-like form--may be assigned to the Ceramic period. Young skeletal material also showed a close genetic relationship to the Hazelton population. Tentatively it is assigned to Parker even though Keith Phase materials are present in the area. Howard-Rollin is, for lack of more data, assigned to the Parker Phase.

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